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IRON AND COAL
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Market Prospects for Coal

IN its "Revised Plan for Coal," the National Coal Board assumes that by 1965 the total demand for British coal, both inland and export, will be within the range of 200,000,000 tons to 215,000,000 tons a year, compared with 228,000,000 tons in 1956 and 195,000,000 tons in 1959. In other words, it is believed that there will be a measure of levelling out and even some improvement during the five years ahead. What justification is there for this degree of optimism? In its latest broadsheet, entitled "Market for Coal,"* Political and Economic Planning examines the board's claims and discusses the future prospects of coal in its four main markets—the "organized" consumers, industry, the home, and exports.

As far as the "organized" consumer markets—power stations, coke ovens, gasworks, and railways—are concerned, the first two will clearly expand and the other two are likely to contract, so that the net effect over the next five years may be an increase of 10,000,000 to 15,000,000 tons. The board has been able to consult the responsible organizations in these markets and discuss their plans, and the broadsheet agrees that these plans, broadly speaking, provide a reasonable guide. In general industry, there is no such straightforward guide to future requirements. Conditions vary from consumer to consumer and there is strong competition from oil. Says the broadsheet:—"No single or simple solution is possible, as it might be in the case of the organized consumers. . . . The industrial market is much too varied for that. What is clearly required is a strenuous and continued sales effort. There should be no minimizing the difficulties of the task. For while the coal industry may be mobilizing its resources to conduct the fight, its major competitor, the oil industry, is already well advanced in its sales promotion, and on the whole has the benefit of the consumer's preference for a 'modern' fuel."

The broadsheet points to the unfortunate comparisons often made between the costs of using coal and using oil today, the coal plant on which the comparison is based being an old one with a falling efficiency and the oil plant a new one on which higher efficiencies are attainable. The fact that in the general field of heating and steam-raising the modern boiler plant fired on solid fuel with mechanical stokers can be as efficient as any fired on oil—in some cases more efficient—is something which the coal industry and the appliance manufacturers should vigorously publicize.

Quality, service, cost, and publicity are important factors in meeting competition; so also is convenience, on which count coal often suffers in relation to oil. PEP believes with us that coal has got answers to the challenge on these grounds. Today, a large office block can be heated with a completely automatic coal-fired boiler. PEP points out that from the consumer's point of view there would be virtually the same degree of convenience as with oil, but that the fuel running costs would "almost certainly be lower."

The undoubted importance of the domestic market for coal is fully appreciated by the compilers of the broadsheet. Not only is it important in itself, absorbing over 30,000,000 tons of various types of solid fuel a year, but "it also influences more than any other the formation of public opinion about coal. The coal industry would therefore be wise to devote an exceptional amount of attention to the household market." The Coal Board has a great deal of leeway to make up. During the years of coal control, domestic fuels lost ground steadily at the expense of gas, electricity, and oil, all of which were untrammelled by restrictions, and all of which spent and still spend enormous sums on advertising and publicity. There has, in fact, been an all-round attack on coal, to make it appear an outmoded fuel, not only in the domestic market, but also in the industrial field. PEP believes this view to be entirely misguided, but also recognizes the fact that the NCB and the coal trade have got to fight hard to pin coal back securely on the fuel and power map.

As far as domestic supplies are concerned, the broadsheet believes that the NCB must make strenuous efforts to ensure that regular supplies leave the collieries properly prepared, and that the retail trade must make efforts of equal intensity to ensure that the coal reaches the consumer in good condition and under recognizable descriptions. It points out that there is no time to be lost in improving supplies of best anthracite and dry steam coals. There is a serious risk that users who cannot get their preferred qualities may forsake solid fuel altogether. In fact, the sooner the new South Wales pits come into operation the better. Recognizing the importance of service to the householders, PEP suggests that an impulse towards improved service might be achieved if the NCB

* Broadsheet No. 439, PEP, 16, Queen Anne's Gate, London, S.W.1 (3s.).

included in its terms of sale inducements to those merchants who satisfied certain agreed standards. It concurs, however, that it would not be easy to devise an effective scheme.

Another point in favour of solid fuel in the home is crystallized in figures quoted by PEP, which show that the gravity-feed anthracite boiler for central heating has the lowest cost per therm, when compared with oil, gas, and coke-fired boilers. Recent figures quoted in "Which?", journal of the Consumers' Association, Limited, show also that openable or closed solid-fuel stoves have the lowest cost for the continuous heating of individual rooms. On the score of economy coal can win hands down in most fields.

Concerning the coal export market, the PEP broadsheet agrees that the NCB is probably being realistic in assessing the export level which might be reached within the next five years at no more than 10,000,000 tons. This means doubling the present rate and will require considerable effort, in PEP's opinion, involving, among other things, exercising a skilful judgment on the export prices to be charged, so as not to miss any opportunities for getting back into the market, but at the same time not to weaken the market still further.

In summing up, the broadsheet emphasizes certain needs if the market for coal is to be maintained and expanded. First, quality must be maintained with consistency, which means high standards of preparation and strict control over despatches from collieries. Secondly, consumers must be provided with a comprehensive service, be it from the NCB or the merchant. This service must not only include selection and despatch of the right type of coal; the consumer must be advised on the best way to handle the fuel. As a third objective, PEP, which recognizes the advantage of the recent stability in coal prices, advocates a reduction in the cost of coal to the consumer, by way of advice on using cheaper grades, installing fuel-saving appliances, saving labour, mechanical conveyance to boilers, and ash removal.

Fourthly, PEP stresses the need for publicizing coal. Whether the policy of undertaking virtually no publicity during the period of coal shortage was justified is now an academic question. But there was nothing to correct the growing public impression of coal as a fuel of uncertain supply and questionable quality. "Unless this impression is now replaced with a more positive one, the efforts made to ensure high standards of quality, consistency, and service will, to a large degree, be frustrated," says the broadsheet. The coal industry has a long way to go before its expenditure on publicity gets near the level of that of other industries of comparable size.

The NCB, which welcomes the "constructive attitude" of the PEP broadsheet, and accepts its four main objectives, agrees that if coal is to retain its present position in the industrial market there must be a rapid intensification and extension of its publicity and selling efforts. The board has already started on the road towards creating the impression that coal is not an outmoded fuel, but it has severe competition to contend with. It has also started to train a body of technicians and salesmen to advise coal users and promote the sale of coal to industry. In the domestic market, both the board and the Coal Utilization Council are devoting a great deal of attention to the promotion of sales.

If the problems of quality, service, cost, and publicity are tackled vigorously PEP believes that "the period ahead should be a good deal more stable for coal than the period just past." The main requirement is to see that from pit bottom to works' stack and consumers' store the user gets what he wants and burns it in the most efficient manner.

Fall of Dirt Killed Pit Worker

SLIGHT fall of dirt, which killed one of two stone contractors at Rossington Colliery (Yorks), occurred 15 minutes after a deputy had examined the area and considered it safe, a Doncaster inquest jury was told last week. A verdict of Accidental Death was returned on Mr. Charles Bennett (31).

Mr. George William Cook, who was working with Mr. Bennett, said they were enlarging the roadway. "It has been the practice to chock up the roof, but this was not done in this case because it was too dangerous to get up," he said. "Only 15 minutes earlier the deputy examined the place, but did not tell us to chock up the roof." The deputy, Mr. Jack Cooke, said he examined the place shortly before the accident and suggested a ring should set up. "No further precautions could have been taken and I considered it safe," he said. "In the report book, the previous deputy had just written the word 'safe'."

The coroner, Mr. W. H. Carlile, commented: "It does strike me that it would have been possible to take some measures to provide more safety. There was some danger here. No doubt the matter will be pursued to determine whether it was the safest manner to work."

Appeal to Minister by Private Mine Owners

SPECIAL appeal to the Minister of Power, Mr. Richard Wood, is being made by private mine owners, who are concerned about the National Coal Board's plans to limit the coal they mine and to increase royalties. Private owners have been told they must make a contribution towards cushioning the coal crisis by cutting their output.

Total output from all private mines last year was 2,600,000 tons. The board is expected to propose that output this year should be limited to 2,000,000 tons, next year to 1,750,000 tons, and in future years to 1,500,000. The proposal to increase royalties is regarded as a routine periodic review rather than a coal crisis measure.

Increased Efficiency Aim

DURHAM DIVISIONAL COAL BOARD REVIEW

POLICY of providing continuity of employment, as far as possible, for those already in the industry, is to be continued by the Durham Divisional Coal Board, its chairman, Dr. William Reid, said at a recent Press conference. Some redeployment of manpower would be necessary. This would involve the transfer of men from the declining pits to the developing collieries and he asked for the co-operation of all concerned to preserve the well-being of the industry in the county.

During the past year overall productivity had increased from 20.7 cwt. per manshift to 21.5 cwt. "While this is an encouraging advance in an elderly coalfield, we are not complacent about the situation," he said. All concerned were determined that the upward trend would continue in order to make the division more competitive and, he added: "We have set our sights on at least 22.1 cwt. per manshift by the end of this year."

The percentage of power loading increased in 1959 from 19.78 to 27.36 and the face O.M.S. from power loading reached 5.05 tons, against 4.47 tons at the beginning of the year. O.M.S. on other faces was 3.5 tons.

Reconstruction Schemes Completed

By last December 19 major reconstruction schemes had been completed, the Hawthorn combined mine being an outstanding example. The division's efficiency would be even more pronounced as the remaining 17 major schemes now in progress were completed. Reorganization last year took place at 34 collieries involving a total of 2,768 men, of whom only 809 were declared redundant.

This year the labour force had to be reduced by 4,000, of whom 1,000 would be men over 65. The balance would be further reduced by normal wastage. Durham had a good record in matters of redundancy. Every effort was made to secure alternative employment and there was close co-operation with the appropriate Government ministries to this end.

As with coal, coke had suffered a reduced demand, but the resurgence in the steel industry was beginning to have an effect and some grades were no longer plentiful. Therefore, the closure of the Bearpark plant had been postponed and would continue meantime in reduced production. Closure of the Langley Park plant had also been postponed, at least until the end of this year.

"Every effort is being made to increase our sales of both coal and coke, especially in the oversea markets," declared Dr. Reid. "While the amount of new business received is limited it is encouraging." Quality, service, and cost would be the deciding factors in competition with other fuels, and they must see that their products did not suffer in these respects. Costs had already been cut, administrative as well as operational, and the drive to economize, and increase efficiency would be pursued with the utmost vigour."

WORKS TOUR of the Steel, Peech, & Tozer branch of the United Steel Companies, Limited, Rotherham, was made on Wednesday of last week by a party of Yugoslav local government officials.

Betteshanger Men at Hobart House

STRIKE of 2,000 miners at Betteshanger Colliery (Kent) is locally described as official, but the president of the National Union of Mineworkers, Mr. W. E. Jones, stated on Wednesday that the strike was not official. The dispute is against 140 redundancy notices. The men are receiving strike pay.

Mr. Jones pointed out that the strike "is contrary to the rule of the NUM and to the advice given to the Betteshanger branch of the union through the Kent Area, at the last two meetings of the national executive committee of the union."

Following an interview with officials at NCB headquarters at Hobart House in London on Wednesday, a deputation of six men from Betteshanger staged a "stay-in" strike. Police were called and the men later left by a side entrance. A party from the colliery went to the House of Commons where they talked with Mr. John Arbuthnot, Conservative MP for Dover, about the redundancies.

Later in the day between 80 and 100 of the Betteshanger men went into Hobart House to try to see Sir James Bowman, the NCB chairman. They were seen by Mr. Jones and other NUM officials while other miners with banners protested outside the building.

REALISM TRAINING FOR SCOTS RESCUE TEAMS

HOT and humid chambers have been installed in the mine rescue station at Cowdenbeath (Fife) to train rescue brigade members to work under the most difficult conditions and the GPO is to provide the brigade with a new call-out link-up to muster the team at an "incident" as quickly as possible.

This was stated by Mr. James McClelland, West Fife Area safety engineer of the Scottish Divisional Coal Board, at the annual dinner of Cowdenbeath central rescue brigade. These new developments, he said, were intended to improve the efficiency of an already highly efficient brigade. Afterwards, he presented long-service medals to five men with 10 years' service and 18 with five years' membership.

IT WAS REPORTED from Prague on Tuesday that Czechoslovakia is setting up 11 new steel rolling mills with an annual output capacity of more than 3,000,000 tons. The mills are expected to be completed this year and will help Czechoslovakia equal the *per capita* output of the United States by 1965.

Passing Thoughts . . .

LET us pause for a moment to look at this exotic and fabulous character. The exuberant moustache, the blinding dazzle of all those badges on his motor-car (NAB 1), the top hat on Budget Day, the trumpet voice—one of Mr. Nabarro's engaging qualities is that he frequently seems to be caricaturing himself. . . . If half of what he says is true, we shall soon be having a crisis in the coal industry as serious as the present one on the railways.—Political correspondent of The Observer.

I apologize to the right hon. gentleman [Mr. George Strauss] for missing the early part of his speech, but I was having a pint of ale and a sandwich.—MR. NABARRO.

Courage is certainly something Mr. Nabarro does not lack. Beneath the celebrated moustaches there is a stiff upper lip that has never wavered during the long campaigns he wages against, among other people, successive Ministers of Power.—Glasgow Herald.

If Mr. Nabarro has a scheme to improve the coal industry let him come forward with the details.—Western Mail.

It is, of course, very unlikely that the capital cost of nuclear power will come down to the level of a coal station, but, in compensation, nuclear power stations will have much lower running costs because of the high energy yield of the uranium metal fuel.—SIR LEONARD OWEN, member for production and executive head of the production group, UK Atomic Energy Authority, in a special article in The Scotsman.

Most of the speeches in Parliament, important though they may be, are as boring as TV's weather report.—HANNEN SWAFFER, *in The People.*

Outside the House of Commons there are few people left with any appetite for theoretical debate for and against nationalization of steel. Inside old enthusiasms take an unconscionable time to die. On the Left the dogma of outright State ownership refuses to lie down. On the extreme Right the notion of a mixed economy has not yet been accepted.—Glasgow Herald.

Bookmakers' runners do not work in factories because they are interested in the work or in their weekly wage but because they can earn five or six times their weekly wage.—MR. GEORGE WIGG, *Labour MP for Dudley.*

There are many easier ways of earning a living nowadays than humping coal. Until there is greater evidence of a really dynamic approach by coal merchants to reshaping the distributive system . . . it will be scarcely true to speak of the coal industry being in good shape to meet the challenge of other fuels.—Birmingham Post.

. . . public confidence must be won—and retained. That is the prime secret of success in all industries and businesses. Compared with other major industries, the coal industry is still behind the times in some important respects.—Nottingham Guardian Journal.

Every time I go to London and see the huge stocks of coal outside the gasworks there, I absolutely shudder. I think all that coal has been brought all that distance when we in the Midlands could easily turn it into gas and put it down a pipeline only 100 miles in length.—SIR ARTHUR SMOUT, chairman of Murex, Limited, metallurgists, etc., of Rainham (Essex), addressing members and officials of the West Midlands Gas Board, of which he was, until recently, a part-time member.

The miners will have no cause to complain against the [Derbyshire] county council. We fully support them and if every council in the country did the same for its own miners, the coal industry would have nothing to fear.—ALD. NORMAN GRATTON, *vice-chairman of Derbyshire County Council.*

25 YEARS AGO.—A conference of the National Union of Railwaymen resumed consideration yesterday of the proposed scheme for new national negotiating machinery. The new machinery, which will come into operation very shortly, is expected to ensure permanent peace in the railway industry.—From the Glasgow Herald.

The epoch of small firms working independently and doing their own research will disappear very quickly, whether people like it or not, and firms will have to form larger units in order to provide money for scientific research and development.—MR. NORMAN FISHER, *principal of the National Coal Board Staff College at Chalfont St. Giles (Bucks), in an address to members of the Coal Industry Society at Mansfield Woodhouse (Notts).*

We make an offer to the NCB. Let the Betteshanger branch of the NUM take over the colliery. We'll make it among the most economic in the country, or we'll bear the loss.—MR. LESTER MAGNESS, chairman of the Betteshanger branch of the NUM, in a letter to The Times in reply to a letter from Mr. J. H. Plumptre, general manager of the South-Eastern Divisional Coal Board.

Inquiry into Nigeria's Coal Industry

PROBLEMS now confronting Nigeria's coal industry, which is managed by a statutory corporation, the Nigerian Coal Corporation, are to be the subject of a full-scale inquiry.

The decision was reached following discussions between the Federal Prime Minister and the Premier of Eastern Nigeria.

A further result of their meeting is that 2,000 mineworkers who were to become redundant will now remain.

It is understood that the Eastern Government has already given up £200,000 of the royalty it receives on coal to help relieve the situation. The crisis in the industry arose over the decision of the Nigerian Electricity Corporation, the Nigerian Railway Corporation, and the Ghana Railways to reduce drastically their coal consumption because of the change-over to diesel power which has already proved more profitable.

EXPLOSION IN EAST GERMAN PIT

FOLLOWING an explosion on Tuesday, 79 men were trapped in the East German Karl Marx Colliery, Zwickau, south of Leipzig. A raging fire made rescue efforts extremely difficult and there is little hope that the trapped men will still be alive.

The cause of the explosion, which took place 3,200 ft. below ground, is still unknown. Forty-four bodies have been recovered and 51 other miners rescued, most of whom are now stated to be recovering.

In Parliament

LOANS TO STEEL FIRMS

Tory Backbenchers Urge Denationalization

JOINED this time by Viscount Hinchingbrooke (Con.) and to a lesser extent by Mr. John Peyton (Con.), Mr. Gerald Nabarro (Con.) continued his attack on nationalization when Mr. Richard Wood, Minister of Power, moved the second reading of the Iron and Steel (Financial Provisions) Bill. Demands for the complete return of the steel industry to private enterprise were strenuously combated by members of the Opposition. The Bill authorizes loans of up to £120,000,000 to Richard Thomas & Baldwins, Limited (still State-owned) and Colvilles, Limited, for steel projects' development.

The MINISTER said the Bill was merely concerned with the method of financing the loans, providing for them to be made from the Consolidated Fund. Exports were now running at a considerably higher level than imports; production was rising and was expected to reach 24,000,000 ingot tons of steel this year. This was very nearly the maximum capacity of the industry.

The Bill was in no way concerned with questions of denationalization, but it did draw attention to the large loan the Government was making to RTB —a company still in public ownership. He did not believe it desirable to specify a detailed plan or timetable on denationalization. The programme of disposals would continue, however, but the manner in which it was carried out must be a matter of judgment.

Mr. Marquand's Warning

The Minister went on to say that the House might like to know how the intention to make this loan affected the progress of divesting the remaining assets held by the Iron and Steel Holding and Realization Agency. Since 1953 they had pressed forward as quickly as possible with the return of the industry to private enterprise. He could not deny that the process had been made more difficult by the uncertainty which had been overhanging the future of the industry because of the declared intention of the Labour Party to renationalize the industry if returned to power last October. He hoped that uncertainty had now been dispelled.

The remaining holdings of ISHRA fell into four groups—fixed interest securities, Richard Thomas & Baldwins which was the largest firm still under public ownership, the 10 small companies, and the outstanding loan by the agency to the Steel Company of Wales, Limited. The programme of disposal had to take into account the state of the market, the demand for the different kinds of security and share capital which the holdings represented, the nature of the undertakings, and the Act's requirements.

Commenting on the 18 months which he said had been lost in expanding strip production because of the lack of power in the hands of the Iron and Steel Board and the timidity of the Government, MR. HILARY MARQUAND (Lab.) warned that "if there is any messing about with this fine public enterprise (RTB) there will be an explosion of anger among the iron and steel workers throughout the country." They wanted to be sure that there would be no handing over of the so-called equities to private speculators and finance houses so that they could scrape off the cream of the profits.

MR. JOHN PEYTON (Con.) thought the modern, dangerous fashion of "robbing industrial Peter to pay political Paul" had gone too far. They had now the rather sad spectacle of the Government lending £120,000,000 to two firms, one which could in the present circumstances go to the market and the other which—had the policy of denationalization been pursued with more vigour—would also have been able to go to the market. MR. ENOCH POWELL (Con.) also thought the fact, the size, and the timing of the advances to RTB should be such as neither to prevent nor hinder the restoration of the company to private ownership. There was no longer any real doubt that the steel industry could obtain in the normal manner the finance for its development.

"I do not believe it is right for the Government to pour public money into enterprises, either by this sort of Bill or by means of the Local Employment Act to establish industries in uneconomic parts of the country. I hope the loan to Colvilles will be renegotiated," said VISCOUNT HINCHINGBROOKE. He believed "this modern radical Toryism" which they were now getting from the Government would call upon it the nemesis of State control and nationalization.

In the last 18 months the Government had been engaged in offering or giving some £250,000,000 in help to firms, said MR. JO GRIMOND (Lib.). "I would not call this bastard Socialism but straight out of the Labour Party manifesto." If the Government was going to supply this money to Colvilles should it not take some equity interest? he asked.

The Opposition had damned the Bill with faint praise and some of the Government backbenchers had been highly critical of it, said MR. NABARRO. He did not like it either and reserved his position on the committee stage. The growing measure of State intervention was "grossly inimical to Tory beliefs and objectives." The total State investment in steel, if the provisions of the Bill were agreed to would be £360,000,000; eight years ago it was £250,000,000. The increase of £110,000,000 was the antithesis—the negation of denationalization.

Asking when ISHRA was going to be terminated MR. NABARRO said he wanted a firm assurance that the Tory Party was going to honour election promises. What were the objections now to Colvilles and RTB going to the stock market for their money? "We have repealed the Steel Act, but we have not denationalized steel. We have increased the State stake

in steel. I believe it should be the purpose, policy, and objective of the Conservative Party to translate the £360,000,000 of State investment to the hands of private investors within the lifetime of this Parliament."

MR. JACK JONES, DR. JOHN CRONIN, and MR. GEORGE STRAUSS, all Labour MPs, criticized the Bill in making use of taxpayers' money to provide profits for private enterprise. It was violation of all the decent principles of public finance, said Mr. Strauss. The Opposition, however, would not vote against the second reading as it might delay the South Wales and Scottish projects.

Winding up the debate, MR. REGINALD MAUDLING, President of the Board of Trade, said the loans were a good investment, their conditions were properly designed to safeguard the interests of the taxpayers and to ensure a reasonable return. The industry was producing large quantities of steel at highly competitive prices and the country had an enormous net export of steel in a highly competitive international steel market.

Whereas the Government did not believe in State patronage as a principle, it did not believe it wise to withhold assistance from an industry when it was clear that help was needed and in the national interest and such resources were not forthcoming from private sources. He reminded the House that so far as setting up a strip mill was concerned it would have been cheaper to put the whole thing in South Wales. While the Colvilles' project was an economic one the company was setting up capacity in advance of demand. It was also setting up a new production line not entirely on commercial considerations, but also on social considerations. Moreover, it was making a large contribution to the policy of expanding industry in Scotland.

Government Loans to Private Industry

CRITICISMS in the House of Lords on the large sums of public money spent on Government assistance to industry, made particularly by Lord Stonham and Lord Grantchester, were replied to by the PAYMASTER-GENERAL, Lord Mills (Minister of Power in the last Government).

LORD MILLS

Lord Stonham had criticized the fact that money was being advanced to private industry on a fixed term arrangement. He (Lord Mills) would say this about Colvilles, Limited, It was undertaking a very great risk in providing sheet steel capacity in front of demand. The Government felt it was fully secure and the greater risk was being taken by the firm. Government policy was that money should only be allowed to private industry in exceptional circumstances and high in these circumstances would be the desire to maintain or extend employment and to improve the export trade by the raising of private production which would not otherwise be there. If the Government insisted upon having the best of both worlds—security, preference, as well as some stake in the equity, and representation on the board, many projects which deserved Government assistance would never see the light of day.

LORD STONHAM had insisted that the financial provisions in relation to Colvilles were intolerable and asked why the Government should not use the money to buy a share in the equity. LORD GRANTCHESTER said he would rather see the Government not make the advances at all.

Estimating that Colvilles would be borrowing at about 4 per cent., LORD SHEPHERD asked if it tried to borrow at that figure in the City would it be successful. When it was realized that the company had only £10,000,000 in equity and £14,000,000 of Government loan, was it any wonder that it should make a profit?

LORD CITRINE said he saw nothing wrong in the principle of Government subsidies for industry depending on the circumstances and the conditions under which they were granted. VISCOUNT ALEXANDER of HILLSBOROUGH foresaw the time when a larger number of industries would be nationalized and when the majority of other industries would be brought under Government control.

Winding up for the Government, the EARL of DUNDEE, Minister without Portfolio, said that some peers seemed to assume that private industry always made profits, but there might be a possibility that the presence of Government directors would restrain certain types of industries from taking good risks. It was worth considering the risks as well as the advantages of having equity holdings by the Government in every type of concern.

Safety Regulations in Mines

REPORT by a divisional inspector of mines on a recent mining fatality in Yorkshire revealed that certain sections of the Mines and Quarries Act, 1954, were not being carried out and that safety regulations were being ignored, said MR. RICHARD KELLEY (Lab.). He added that these factors were considered to have contributed to the cause of the explosion, and asked what steps were to be taken in the matter.

The PARLIAMENTARY SECRETARY TO THE MINISTRY OF POWER, Mr. J. C. George, said that the Minister was now discussing with the NCB and other interested authorities the best means of preventing a recurrence of the circumstances giving rise to this accident. Earlier, Mr. George had declined Mr. Kelley's request for the Minister to take powers to ensure that Regulation 7 of the Coal and Other Mines (Mechanics and Electricians) Regulations, 1956, was fully operative at all applicable places of work. Mr. George said the Minister was not prepared to ask Parliament to amend the Mines and Quarries Act, 1954, so as to detract from the manager's responsibility for the safe working of the mine in accordance with the Act and regulations.

In a further reply to Mr. Kelley, Mr. George said he could not without very considerable research say precisely how many reports had been received dealing with fatal accidents in mines in which certain safety regulations had not been carried out because of shortage of NCB staff. He assured Mr. Kelley, however, that the number was very small.

MR. ALBERT ROBERTS (Lab.) asked whether the Minister would introduce new regulations under the Mines and Quarries Act making it compulsory that no electrical apparatus should be operated by any workman unless he was adjudged capable, by examination, of detecting firedamp by recognized gas detectors in use at the colliery of employment. He also asked that

such a detector should be available before a workman was allowed to operate electrical apparatus.

MR. GEORGE said that the Minister could not agree to introduce regulations requiring the use of gas detectors in many cases where their use was clearly unnecessary. Managers already had difficulty in finding sufficient men willing to undergo tests of ability to detect firedamp and carry and use firedamp detectors underground, in order to comply with the present regulations.

LOCAL AUTHORITIES AND COAL

ATTENTION of local authorities is to be drawn to the relative merits of coal and its derivative fuels, such as coke, said the MINISTER OF POWER, Mr. Richard Wood. He added that the new technical sales service of the NCB was also being brought to the notice of local authorities.

The Minister went on to say that local authorities would already be aware that coal installations with new mechanical stokers were recently exempted from the provisions of the Clean Air Act relating to smoke control areas. He was making a written reply to MR. JAMES BOYDEN (Lab.), who asked whether letters could be sent to local authorities asking them to consider the merits of using coal and coal-burning equipment in establishments under their control.

LIQUID METHANE

COST of plant needed for regasification in connection with the use of liquid methane to produce gas, and also the cost of liquefaction plant for a ship of 30,000 tons built to incorporate the results of the Methane Pioneer trials, were asked for by MR. NEIL MARTEN (Con.). He also asked whether, as a result of the six voyages of the Methane Pioneer, the Minister of Power was able to give an estimate of the cost per therm of heat from this source of fuel, and how this compared with the equivalent cost of oil and coal.

MR. J. C. GEORGE, Parliamentary Secretary to the Ministry of Power, said the answers could not be given because the experiment had not been completed and the Minister had not received an appraisal of it.

LOAN TO COLVILLES

DEVELOPMENT scheme of Colvilles, Limited, for which the Government had undertaken to lend up to £50,000,000, contained provision for coke ovens and associated by-product plant at an estimated cost of £2,500,000, said the PARLIAMENTARY SECRETARY TO THE MINISTRY OF POWER, Mr. John C. George. He added that it was not possible to say precisely how much of the loan was attributable to by-products.

Mr. George was replying to MR. EDWIN WAINWRIGHT (Lab.), who asked what portion of the proposed loan for the new Ravenscraig plant would be for the erection of a chemical and by-product plant.

PROVISIONAL FIGURES for 1959 showed that 69,000,000 tons of coal were power loaded, compared with 8,000,000 tons in 1950. The amount of coal mechanically cut in 1958 was 210,000,000 tons, compared with 176,000,000 tons in 1950.—The Minister of Power in a written reply to Lt.-Col. Walter Bromley-Davenport (Con.).

DISPOSALS of coke by the NCB to blast furnaces and foundries in recent years were given by the PARLIAMENTARY SECRETARY TO THE MINISTRY OF POWER, in a written reply to Mr. Edwin Wainwright (Lab.), as follows:—1952, 4,081,000 tons; 1953, 3,850,000 tons; 1954, 3,762,000 tons; 1955, 3,944,000 tons; 1956, 3,782,000 tons; 1957, 3,392,000 tons; 1958, 2,406,000 tons; 1959 (provisional), 1,960,000 tons.

REFERENCE WAS made by Mr. Tom Driberg (Lab.) to the "stay-down" strike at Betteshanger Colliery, when he asked whether a direction could be given to the NCB that ministers of religion should always be allowed to go down mines when their ministrations were desired by miners. The Parliamentary Secretary to the Ministry of Power said in a written reply that this was a matter best left to the discretion of the board.

IN WRITTEN REPLIES to Mr. James Boyden (Lab.), the Minister of State, Board of Trade, said that negotiations would not take place with the Polish Government to reach a commercial agreement regarding UK and Polish coal exports to Scandinavia as it was not considered practicable or desirable. Regarding the free importation of coal into France the Minister stated that such imports were in the hands of a State monopoly which negotiated commercially with suppliers.

THE GOVERNMENT, the National Coal Board, the Gas Council, and private industry are developing gasification processes based on coal and are carrying on research to improve the use of by-products. In particular, gas boards are setting up two Lurgi plants and the NCB a Ruhrgas plant. The longer term prospects are being examined by the Wilson Committee, but it would be unrealistic to expect such processes to contribute much to the reduction of stocks in the near future.—The Parliamentary Secretary to the Ministry of Power in a written reply to Mr. Stephen McAdden (Con.).

ASKED BY Mr. Joseph Slater (Lab.) to assess prospects of coal exports to Denmark in the next five years in face of increased competition from Poland, the Parliamentary Secretary to the Ministry of Power, said that exports to Denmark in 1954 were 3,400,000 tons. They rose by 7 per cent. in 1955, but dropped each succeeding year to 1959 when they amounted to 1,000,000 tons. So far, shipments and sales this year were much better than a year ago. The level of exports over the next five years would depend on Denmark's demand and the success of the efforts of the National Coal Board and exporters to sell coal in competition with other suppliers and with oil.

USE OF TAR IN STEEL INDUSTRY

GIVING evidence for the Registrar of Restrictive Trading Agreements on the eighth day of the case of the fixed price agreement of the Phenol Producers' Association, Dr. Alfred Parker, a chemical engineering consultant, told the Restrictive Practices Court on Wednesday that tar and fuel oil had an equally good heat-producing quality and there was a potential market for tar in steel production.

A number of the large steelworks already used tar as a fuel, but he did not know what was the corrosive effect on the boilers. It would take 10 years to make a test, he said.

THE COMPREHENSIVE range of diesel engines of A.E.C., Limited, Southall (Middx), will now be extensively marketed throughout Canada under a recent agreement with Orenda Industrial, of Ontario, a leading Canadian jet engine manufacturing company. Orenda will develop the sale of A.E.C. engines for marine, industrial, and trucking purposes. The company is a member of the Hawker-Siddeley Group, Limited, which will continue to represent A.E.C. interests for road passenger vehicles in the Dominion.

Martin-Black Group's Expansion

CONTINUED expansion is reported in the home and export turnover of Martin, Black & Company (Wire Ropes), Limited, Coatbridge, near Glasgow, and of its associated company, the Speedwell Wire Company, Limited. New machinery installed in the Martin-Black ropery and the Speedwell Wire building over the last two years has led to output increases of 20 per cent.

MR. G. A. BLACK

The wire mill, claimed to be the most modern in Britain, is producing the world's fastest wire drawing machines. Wire mill plans for the coming 12 months include machinery that will mean a further increase in production of close on 30 per cent., as well as the building of a new factory and warehouse. A new rope testing machine and prestressing equipment are part of the extensive expansion due to take place in the ropery over the next few months.

The export expansion of Martin, Black & Company (Wire Ropes) is the responsibility of Mr. G. A. Black, who joined the company in 1939. He has held his present position since 1953.

Five new appointments are announced by the Martin-Black group. Mr. J. McVey, who becomes personal assistant to Mr. Alex Johnston, the works director, will have the title of production manager. The other appointments are:—Mr. J. Gardiner, chief wire planner; Mr. W. McKenna, chief rope planner; Mr. J. Miller, wire production manager, and Mr. H. Weir, rope production manager.

NCK-RAPIER, LIMITED

NAME of the N.C.K. Rapier Sales Company, Limited, is to be changed to NCK-Rapier, Limited, with effect from Tuesday. The company came into operation at the beginning of last year and is concerned with the sales and servicing of the heavy duty excavators and cranes produced by Newton, Chambers & Company, Limited, Thorncliffe, near Sheffield, and its subsidiary, Ransomes & Rapier, Limited, Ipswich. The company's offices are at 32, Victoria Street, London, S.W.1.

Chairman of NCK-Rapier, Limited, is Mr. P. J. C. Bovill, managing director of Newton, Chambers, and among the other directors are Mr. S. C. Tyrrell and Admiral R. S. Warne, R.N. (Retd.), joint managing directors of Ransomes & Rapier. Mr. Ian S. Whiteman, formerly general sales manager of the excavator division of Newton, Chambers, is the company's general manager.

THE NATIONAL UNION OF MINEWORKERS has affiliated nationally with the Movement for Colonial Freedom.

New Company Formed by EFCO and Stein & Atkinson

FORMATION of the Foundry & Metallurgical Equipment Company, Limited, with headquarters at Netherby, 161, Queens Road, Weybridge (Surrey), is announced by EFCO, Limited, and Stein & Atkinson, Limited. The new company will design, manufacture, and supply an extensive range of foundry equipment, including gas and oil-fired crucible melting furnaces, gas, electric, and oil-fired annealing furnaces and ovens specifically for foundry use, batch and continuous core stoves, core blowers, mould driers, sand driers, shell moulding and mould closing machines, and gravity die-casting equipment. In addition, it will manufacture and supply, under licence, the EFCO-Diamond rotary reactor for desulphurizing iron and steel by a new method developed in the United States by the Diamond Alkali Company.

The company will also offer complete hot-blast cupola plants embodying air heaters of the well-known Escher type and with the latest water-jacketed reaction zone.

Arrangements have been completed with the Sinex Engineering Company, Limited, for the new company to offer Sinex vibratory equipment for knock-out grids, screens, feeders, and conveyors for the foundry industry and with Aldridge Industrial Oils, of Cleveland, USA, for the sale of die lubricants.

Directors of the new company are:—Mr. D. F. Campbell (chairman); Mr. C. J. S. Atkinson; Mr. J. A. Monks, and Mr. C. H. Williams. Dr. A. G. Robiette is the consulting metallurgist.

Woodall-Duckham Link with Sewage Purification Engineers

PRINCIPAL operating company of the Woodall-Duckham group, the Woodall-Duckham Construction Company, Limited, has contracted to purchase the whole of the issued share capital of Ames Crosta Mills & Company, Limited, sewage purification engineers, of Heywood (Lancs), for the cash sum of £735,000.

Ames Crosta Mills & Company will continue to operate as an independent unit under its present board within the Woodall-Duckham group of companies. Extension of the activities of Ames Crosta Mills & Company in the fields of sewage purification and effluent treatment on a world-wide scale is planned with the financial and engineering support of the Woodall-Duckham group.

Solar Industries Seeks Quotation

QUOTATION for the ordinary capital on the London, Birmingham, and Glasgow Stock Exchanges is the subject of an application by Solar Industries, Limited, the Greenock engineering and metals group. Two issues of capital are being made. One is a capitalization of profits and reserves in 800,000 5s. ordinary shares on a one-for-two basis to holders of February 26. The other is for cash.

Subject to permission to deal in and a quotation being granted, Neville Industrial Securities, Limited, has agreed to subscribe for 800,000 further ordinary 5s. shares at 10s. 3d. per share. An interim dividend of 5 per cent. will be paid on all the ordinary for the year ending March 31.

The High Authority Reports

COAL-STEEL COMMUNITY ACHIEVEMENTS

EIGHTH general report of the High Authority of the European Coal and Steel Community, published on Tuesday, reviews the achievements of Europe's first Common Market. Establishment of the Community, it says, has contributed to an unprecedented expansion of the steel industry, which now has an annual production approaching 70,000,000 tons. In 1951, when the Treaty was signed, steel production was 40,000,000 tons. The Community has also provided the means, during the past year, to arrive at an agreed solution for the Belgian coal crisis.

While the institutions of the Community are solidly established, its association with the United Kingdom has opened possibilities for the solution of certain very delicate questions about temporary restrictions on coal imports in an atmosphere of good understanding.

The High Authority points to the Government's control over prices as a serious problem which distorts competition, forces producers into defensive arrangements, and which could lead to the destruction of the Common Market. This problem, the report says, has to be resolved in order to deal with the High Authority's central problem—the structural adaptation of the Community's coal industry to its new competitive position.

Three Lines of Approach

Three lines of approach are suggested—the closing down of uneconomic units of production, the rationalization of those units which are economic, and the measures to facilitate necessary reorganization, especially by meeting its social consequences.

The report points out that a solution for the coal problem cannot be dissociated from energy policy in general. The change in the general energy situation, coupled with the creation of the Common Market, means that a co-ordinated energy policy is "as inevitable as it is urgent."

Reviewing the progress made so far by the High Authority in co-operation with the executive of the other two European Communities, the report says that recommendations will shortly be made both as regards the principles to be followed in energy policy and the practical steps which should be taken. A start has to be made, it adds, by the harmonization of Governmental action in this sphere.

Good progress has been made within the Common Market in a number of directions. The report states that there has been an undeniable advance in the interpenetration of the previously separate markets, facilitated by the publicity given to prices, the elimination of discriminations, and the suppression of subsidies. These same measures have also made for a more healthy spirit of competition within the Community. Development of productive capacity has been stimulated at the same time by the High Authority's use of its loan-raising powers. It has made available the equivalent of more than £71,000,000 for investment in the industries under its jurisdiction.

LANCASHIRE DYNAMO HOLDINGS, LIMITED—Mr. H. G. Carter and Mr. S. G. Mundy have resigned from the board.

Iron and Steel Board Membership

SIR LINCOLN EVANS has been reappointed by the Minister of Power as deputy chairman of the Iron and Steel Board as from June 1 next. Sir Lincoln, who was formerly general secretary of the Iron and Steel Trades Confederation, has been full-time deputy chairman of the board since it was formed. As from June 1, however, his appointment will be on a part-time basis.

SIR LINCOLN EVANS

The following part-time members have been reappointed as from June 1:—Mr. A. G. Stewart (chairman and general managing director of Stewarts and Lloyds, Limited); Mr. A. E. Pearce (a director of Qualcast, Limited, light repetition founders, etc., of Derby); Sir Charles Connell (chairman of Charles Connell & Company, Limited, shipbuilders and engineers, of Glasgow); Sir Henry Spurrier (chairman and managing director of Leyland Motors, Limited), and Sir Kenneth Hague (deputy chairman of Babcock & Wilcox, Limited).

Mo i Rana Steelwork's Output

FIRST ingot at the Norwegian iron and steel works at Mo i Rana was cast in April, 1955. Total production has now surpassed 1,000,000 tons of ingots. Production in 1956 was 165,000 tons of steel ingots, and in 1959 it was 291,000 tons.

Although production was nearly doubled during this period, manpower has been considerably reduced.

CENTRAL ENGINEERING department of Richard Thomas & Baldwins, Limited, has moved from Bridgend to the site of the company's new steelworks at Llanwern, Newport. The department, headed by Mr. Elwyn Pinches, the company's general manager (engineering), is responsible for the construction of the steelworks.

Steady Drain on Pithead Stocks

SOME coal consumers are managing to replace stocks, in spite of the continuing transport troubles. Industrial consumers increased their stocks by almost 100,000 tons in the week ended February 13, but merchants were finding the demand too great and were drawing on their own stocks faster than they could be replaced. Undistributed stocks continue to dwindle and are now well under 34,000,000 tons.

Consumption continues to rise and is now about 600,000 tons above total weekly output. Exports are holding up fairly well and already this year they are some 23 per cent. up on the comparable figure for 1959.

There were 625,900 wage-earners on colliery books on February 13, against 677,000 on February 14, 1959, the numbers engaged at the coal face being 239,700 and 263,100, respectively. Total absenteeism (all workers) in the week ended February 13, was 14.65 per cent., compared with 15.96 per cent. in the week ended February 14, 1959. Output at the face was 3.938 tons and overall 1.402 in the week ended February 13, compared with 3.781 and 1.381 in the week ended February 14, 1959.

The following table gives (in tons) the output of saleable mined coal by division in the week ended February 20, and the tonnage lost through all causes (holidays, disputes, and go-slows):—

Division.	Week ended February 20, 1960.		Week ended February 21, 1959.
	Total output.	Tonnage lost.	Total output.
Scottish	369,700	4,000	380,900
Northern (N & C) ..	241,800	—	269,600
Durham	469,300	200	480,900
North-Eastern ..	856,700	13,500	896,600
North-Western ..	273,400	1,200	294,600
East Midlands ..	921,600	500	915,300
West Midlands ..	293,500	10,800	323,100
South-Western ..	411,000	6,700	428,700
South-Eastern ..	23,700	10,000	27,900
Great Britain—			
Deep-mined coal ..	3,860,700	46,900	4,017,600
Other deep-mined (including licensed mines) ..	50,400	—	56,900
Open-cast coal ..	158,000	—	267,700
TOTAL	4,069,100	46,900	4,342,200

Mr. Butler Urges Fuel Readjustments

CALL for "readjustments" in the field of fuel and power was made by the Home Secretary, Mr. Butler, in an address to the London Conservative Union on Wednesday. He also said that this Parliament intended to make any changes urgently needed in the public sector. "The problem of rail transport is urgent, but there are also changes of emphasis in the roles of air transport and shipping," he said.

Mr. Butler stressed that the first and fundamental aim of the Government's economic policies was to maintain a sound and expanding economy along with price stability.

THOMAS BLACKBURN & SONS, LIMITED—Miss Dorothy Fielding, secretary of the company, has been appointed a director.

Minister Wants Positive Aid for Coal

FUTURE of industry would not be best served by limiting competition between coal and fuel oil, said Mr. Richard Wood, Minister of Power, in Edinburgh on Monday. "I should like to give coal every chance," he said. "The issues are very important and I would like everyone to consider carefully where coal can play its best part. If the coal industry is going to be helped I want to see it given positive help."

Mr. Wood declined to comment on the question of an increase in the tax on oil. He said "I cannot prejudge the Chancellor's Budget." His visit to Edinbrugh was for informal discussions with NCB officials and the Scottish Gas Board.

Also in Edinburgh on Monday, Mr. Abe Moffat, Scottish area president of the National Union of Mineworkers, said that letters were being sent by the Scottish Trades Union Congress asking local authorities and hospital boards for support in the coal-oil controversy.

Labour councillors are also being circularized by the Scottish Labour Party.

Mr. Moffat added that the Scottish executive of the NUM had accepted with appreciation a resolution by Buckhaven and Methil Town Council calling for severe taxation and restricted importation of other types of fuel.

Derbyshire Miners Enter Public Relations Field

FIRST of a series of "public relations conferences" by the Derbyshire Area of the National Union of Mineworkers was held during the weekend. Mr. Bert Wynn, the secretary of the Area, which has 30,000 members, told his audience: "The mining community does not stand in the way of progress. When oil is 10s. cheaper a ton than coal, then it will be in the interest of the country to use it. At the present moment, though, coal is substantially cheaper."

The public had the wrong conception of the earnings of miners, he said. Many people thought of miners taking home "buckets of money." It was time "these silly tales ceased."

The first to be invited to one of the public relations conference were 40 members of the Labour group of Derbyshire County Council. Mr. Wynn said that the mining industry had neglected its public relations and it had been decided to explain to local authorities and other bodies the problems facing the coal industry so that a better understanding could prevail.

Colliery Ambulance Teams Compete

TEAMS from Arley, Dexter, and Coventry collieries took part in the Sub-Area No. 2, West Midlands, ambulance competition at Arley last week. The senior section was won by Arley and the junior by Dexter.

Awards were presented to the following:—Juniors: 1 Dexter (267 points), 2 Arley (225), 3 Coventry (194); individual winner, Mr. E. Witton (Dexter). Seniors: 1 Arley (297½), 2 Dexter (285), 3 Coventry (269); individual winner, Mr. N. Lloyd (Arley).

POWER LOADING IN THE EAST MIDLANDS

Part 2—Trends in Coal-face Mechanization

By J. SHELDON, B.Sc.Eng.(Min.), M.I.Min.E.*

Development in all phases of face mechanization in the East Midlands Division of the National Coal Board are reviewed in this paper, presented to the Midland Branch of the National Association of Colliery Managers on October 19, 1959. Part 1 of this paper, dealing with the methods used to raise the production of large coal on mechanized faces, appeared in last week's issue of IRON AND COAL.

IN addition to those features previously outlined, everyone is familiar with the work which is recommended in relation to non-mechanized faces, for example: Aids to cleaning out of undercuts; reduction in shotfiring; use of alternatives to shotfiring, such as Cardox, Hydrox and the Armstrong Airbreaker; use of pulsed-infusion firing; substitution of p.v.c. water stemming bags for clay, etc.

Work done outbye the face in relation to new systems of unit bunkering, attention to transfer- and loading-point design, and research on reduction of breakage in skip winding, is also well known.

A factor which does not appear to have had the attention it deserves is the tremendous increase over the last five years in the use of tungsten-carbide tipped cutting picks of all types. It should be remembered that this type of pick when blunted can give rise to increase in motor load and overproduction of fine kervings, in the same manner as the old type of pick.

While a tungsten-carbide tip will give longer pick life, it is nevertheless no insurance against the need for sharpening, and greater attention should be paid to the organization of replacement and sharpening systems for all varieties of this type of pick at collieries.

Greater Concentration and Production Efficiency

Table 8 shows the performance of all the various types of machine in use in the division in terms of averages compared with the best for each type. In every case, with the exception of the prototype new machines and the Meco-Moore, it is evident that there is still room for improvement on many types of installation, even having in mind existing stable hole and ripping techniques. This is particularly evidenced in the case of trepanners, where, taking account of the increasing numbers in use, they show the best average daily performance in terms of advance, area extracted, and tonnage, and yet there is a considerably higher target set by the best figures which have been obtained in the same period.

It is, therefore, incumbent upon everybody to make every endeavour to obtain improved performances from machines already available and in operation. Although it is not intended to imply that the best performances can be achieved in all circumstances, some closure of the gap between average and best still appears to be possible.

In the case of Meco-Moores, the figures quoted include shorter single-shifting faces equipped with

TABLE 8.—*Performance of All Types of Power-loading Machines in the East Midlands.*

Type of machine.	2nd quarter 1959. Average performances.					1st quarter 1959. Best performances.				
	Face advance.		Area extracted.		Pithead output per mch. day.	Face advance.		Area extracted.		Pithead output per mch. day.
	Per mch. day.	Per mch. shift.	Per mch. day.	Per mch. shift.		Per mch. day.	Per mch. shift.	Per mch. day.	Per mch. shift.	
	ft. in.	ft. in.	sq. yd.	sq. yd.	Tons.	ft. in.	ft. in.	sq. yd.	sq. yd.	Tons.
Anderton shearers ..	5 5	3 2	361	208	452	6 5	3 3	387	193	923
Meco-Moores	5 0	2 8	288	152	467	9 6	4 9	398	197	733
Flight L'drs. ..	3 5	2 0	131	78	124	4 8	2 5	182	93	221
Rapid Plough	4 5	2 11	277	185	275	6 6	3 4	377	188	479
Slicers	4 4	2 9	267	168	445	7 1	3 4	486	228	924
Strippers	4 5	3 4	259	193	383	6 11	2 5	386	140	770
Trepanners	5 7	2 11	402	211	500	8 2	3 11	658	316	1,054
Dosco Miners	4 10	3 11	241	197	514	4 11	4 11	309	309	632
Gl. Getters	4 1	2 2	222	115	261	6 7	3 4	308	156	445
Lump shrs.	6 2	3 0	455	218	779	6 10	3 4	451	224	1,036
Midget Mnrs.	2 3	2 3	110	110	91	Prototypes only—no comparable figures				
Buttock ldr.	4 1	4 1	294	294	430					
Mawco C/L	5 7	3 10	171	118	246					
Hnd. Fill. on to AFC ..	5 4	2 10	297	160	338	7 0	3 6	326	163	639

belt conveyors, long faces working two shifts equipped with armoured conveyors, and shuttle Meco-faces equipped with armoured conveyors. It is, therefore, not possible to draw quite the same conclusions in this case.

The limitations of the shuttle system are well known in relation to the problems of strata control. Nevertheless, the longer face working on two shifts and using an armoured conveyor has much to offer in terms of greater concentration and bulk output and, wherever possible, should receive due consideration.

It is, however, becoming clear that with existing machines and the difficulties of advancing roadheads and stables by existing methods, we are approaching the maximum degree of concentration possible, particularly when dealing with the thinner seam sections. To achieve further improvements then will depend upon the development of newer and faster machines, mechanization of, or elimination of, stable holes, and mechanization of rippings. Further efficiency beyond these stages can only result from mechanization and automation of roof support systems and remote control and/or automation of machines.

The logical trend in mechanization in coal mining is, therefore, as in other industries, to economize to the limit in the use of manpower in the extractive processes with the ultimate aim of automation, and in comparison with general advances in technology in the wider industrial field, we apparently lag behind quite considerably. Geological conditions and the structure of some seams may, however, limit the amount of progress that can be made in this direction generally. An examination of recent developments in these fields does, however, establish the trends and possibilities.

Newer and Faster Machines

The trend in higher horse-powers has already been mentioned in relation to the Anderton shearer, the object being to establish faster cutting speeds with consequential improvement in product. A feature of the design of any new machine is the problem whether it is to take a wide buttock or a narrow one. This controversy has raged for some time and is still not completely resolved. It can, however, be generally accepted that the narrower the buttock and the faster the machine, then the better the product sizing will be, and this factor must receive careful consideration for the future.

Action of the trepanning or drum-cutting type have been proved to be more economical in power demand than those of the chain-cutting type. Another factor to be taken into account is that mechanization of roof supports is easier to achieve with narrower buttocks than with wide ones, particularly in the thinner seams. It is, therefore, to be expected that the wide buttock machine of high bulk output capacity may find greater application in thicker seams, although as an interim machine of suitable design, it can bridge a gap in the development of intensive systems of mechanization in thinner seams.

One such machine, applicable in the seam range of 3 ft. to 5 ft., is the Joy buttock miner. This is illustrated in Fig. 7. The machine is designed to take a 5-ft. web; the principle of getting the coal is by means of twin-rotating boring heads surrounded by an adjustable frame cutter chain. The boring heads rotate in opposite directions, overlapping at the centre of the cutting head, and cut coal is fed through the centre of the head on to a transverse chain conveyor which delivers it on to an armoured face conveyor. The machine is double-ended and the centre portion is fitted with caterpillar tracks independently driven.

Each head can be articulated in a vertical plane to assist in following undulations in the seam. The trailing head can be collapsed in height and width when not in use. Power to the boring arms and cutter chains is supplied through suitable gearing

FIG. 7.—JOY BUTTOCK MINER, APPICABLE IN THE SEAM RANGE 3 TO 5 FT.

and an overload clutch from a 100-h.p. water-cooled FLP motor. Power for the traction and conveyor motors and the head positioning jacks is supplied from hydraulic pumps driven by a separate 15-h.p. electric motor. The overall length of the machine is 18 ft. and weight 15 tons.

The machine has undergone trials in the High Main and Waterloo seams in Areas 6 and 5 respectively. Few teething troubles have been experienced and with minor mechanical adjustments, it is mechanically quite sound. Performance has been established at quite a high level and the machine, in a seam thickness of 4 ft. 7 in., has been proved capable of sustained cutting speeds of around 55 yd./hr., more than twice the rate achieved by the Meco-Moore cutter-loader in similar types of coal.

Output per machine shift between May 1 and July 4, 1959, has averaged 430 tons raised and weighed, or 313 tons saleable. Over the same period the o.m.s. has averaged 8.6 tons raised and weighed, or 6.2 tons saleable. The machine is thus capable of stripping a 220-yd. face in a normal shift and can double this performance on a daily basis by double-shift working. The size of the product, based on r.o.m. observations, is given in Table 9, and is compared with the Anderton shearer and trepanner.

TABLE 9.—*Comparative Sizing Tests with the Joy Buttock Miner.*

Size.	J.B.M.	Shearer.	Trepanner.
Above 6-in. ..	8.4	5.5	17.6
6-in. to 4-in. ..	5.7	3.6	7.3
4-in. to 2-in. ..	12.0	11.8	13.2
2-in. to 1-in. ..	13.1	14.6	11.5
1-in. to ½-in. ..	15.4	18.5	15.9
½-in. to ¾-in. ..	20.1	23.7	15.8
¾-in. to 30m. ..	17.6	16.6	14.0
30m. to zero ..	7.7	5.7	4.7

For a machine of such high output characteristics, the +2-in. and −¼-in. fractions are rather disappointing. However, further attention to design features of the head and rotary arms is being paid with a view to effecting improvements. Again the support system using 5-ft. link bars in a staggered pattern was found to be expensive in manpower and further systems are to be tried. Attention is also being paid to the design of a suitable mechanized system of support. It can be said, therefore, that the results so far are most encouraging.

Mechanization or Elimination of Stable Holes

The need for some approach to the stable hole problem, on account of the heavy demand in manpower has long been recognized. Up to quite recently, this has taken the simple form of design and utilization of small portable conveyors to reduce the amount of casting of coal to the conveyor side.

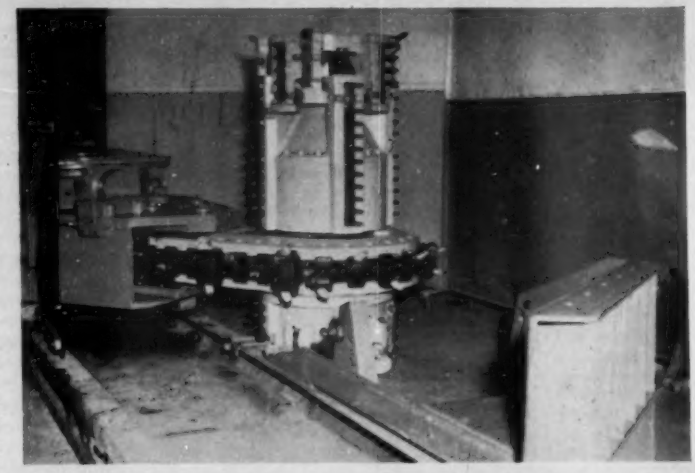


FIG. 8.—PROTOTYPE SINGLE-DRUM VERTICAL SHEARER.

When considering the problem of further concentration, particularly in respect of thin seams, then the need for a concerted attack on this problem is doubly emphasized. The approach to the problem falls broadly into two categories: (*a*) To design a machine capable of stable-hole extraction; and (*b*) to design machines for face operations which do not require stables.

It is debatable whether in solving (*a*) with the associated problems of support and machinery concentration, the answer to (*b*) may not be obtained, thus eliminating the need for (*a*). Such may be the case in relation to the twin-vertical drum shearer. The first stage in development has been completed by the production of prototype single-drum models, which are to be tried on coal faces in the South-Western and East Midlands Divisions. Successful trials have already been concluded on a composite face on the Central Engineering Establishment test site at Swadlincote and in a stone quarry.

The main object of the underground trials is to prove the size consist of the vertical drum product, but it is anticipated that the action will be such as to "rag" the coal off the face rather than cut it. Fig. 8 illustrates the design of the machine constructed at the Central Engineering Establishment for this purpose.

Mechanization of Rippings

In the meantime, a number of lighter and easily portable types of short conveyors for stable use have been designed by various manufacturers and their use should be considered carefully with a view to effecting interim economies in stable hole manpower.

The influence of the intensive systems of mechanization of the last two years has highlighted the unbalanced manpower situation at roadheads, as

well as at stables, in relation to the rest of the face, and the problem of maintaining rapid advances of rippings and stables has tended to be sidestepped to some degree by working longer faces. In the interests of efficiency in the thicker seam sections, a solution to the ripping problem is as urgently required for the stable-hole problem; in fact, in the long run it is nearly impossible to divorce the two.

Again, when considering extraction of thin seams, more rapid face advances to offset the effects of thin coal and probably shorter faces than presently obtaining, are the only solution to maintaining the benefits of concentration enjoyed with present systems of mechanization. In the East Midlands Division, the proportion of thin coal to be mined over the next 10 years will gradually increase, as illustrated in Table 10.

TABLE 10.—*Proportion of Thin Coal to be Mined during the Next 10 Years in the East Midlands Division.*

—	Percentage to be mined from section			
	Above 3 ft. 6 in.	3 ft. to 3 ft. 6 in.	2 ft. 6 in. to 3 ft.	2 ft. to 2 ft. 6 in.
1958	56.7	25.8	12.7	4.8
1963	50.9	27.9	16.1	5.1
1968	45.7	26.7	22.0	5.6
Increase, 1958 to 1968	−11.0	+0.9	+9.3	+0.8

These figures are taken from estimates made in June, 1958, based on an increase of some 6,500,000 tons in total output over the 10-year period. While the present climate of the industry may result in some revision of estimates, the figures do illustrate the trend. Thus not only from the point of view of present efficiency, but from future considerations of efficiency, it is clear that some solution to the ripping problem must be found. Present approaches can be listed as: (*a*) Development of machines to carry out the task of ripping; (*b*) elimination of rippings by advance drivage of roadways in conjunction with pneumatic stowing; and (*c*) development of a mechanized system of ripping.

Ripping Machine

The main features of the ripping machine, the idea for which was originated by C. V. Peake, now Area production manager in Area 5, are shown in Fig. 9. Basically, the idea was to use a number of small diameter picked drums mounted upon a radial arm designed to arc over the full roadway profile. The prototype, now undergoing trials, has two 26-in. by 12-in. deep drums driven by independent hydraulic motors, and mounted upon a frame pivoted at the centre of the machine. The drum-carrying frame arcs about the central position and straddles a semi-circular frame around which passes a pin jointed chain hauling the drum frame *via* a sprocket drive mounted at the centre pivot point and driven from a separate hydraulic motor and gearing.

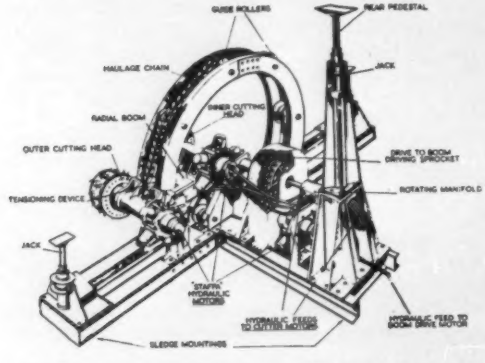


FIG. 9.—BASIC DESIGN OF NEW RIPPING MACHINE.

Hydraulic power is supplied from a 100-h.p. power pack. The base frame of the machine is designed to be held firm at each side in the pack-hole recess by means of vertical hydraulic jacks, and a rear jack is provided for staking the rear of machine to the ripped roof between arches.

From this prototype design, information is being obtained by suitable instrumentation to enable a production model to be constructed. The Central Engineering Establishment at Bretby has designed and constructed the prototype rig and is carrying out the instrumentation.

In the final design, consideration has to be given to the method of disposing of the make of dirt. This may be either by Markham crusher stower or by some adaptation of the principle of the "Rippon" platform.

Advance Drivage of Roadways

The drivage of face roadways in advance of the face is not new and the system has been practised by Continental mining engineers for many years, particularly in Germany and Belgium. Under normal circumstances in the East Midlands Division, the practice would be fairly expensive in manpower on account of the difficulty of getting the forward dirt into the gateside packs.

Developments in stowing techniques over the last few years have provided a possible solution to this problem in the Markham crusher stower. This machine is similar to a normal pneumatic stower with the difference that the paddles and casing are so strengthened as to allow the paddles to crush and prepare normal ripping dirt for passage into the pipeline.

With normal ripping dirt, the throughput of the machine is 12 to 15 ton/hr. and, with friable small stone, the rate of stowing is up to 20 ton/hr. The machine is capable of accepting stone of a size up to 15 in. by 10 in. by 5 in. fairly readily. Requirements of compressed air are provided by means of a 100-h.p. Rootes-type blower and amounts to 2,000 cub. ft./min., at a pressure of 6 to 8 lb./sq. in. One 90 deg. bend can be used with up to 100 yd. of pipeline without appreciable falling off in performance.

Fig. 10 shows a suggested layout for the mechanization of a ripping lip using this technique, and the advanced heading can either be handfilled or mechanized. In the former case, the stower would

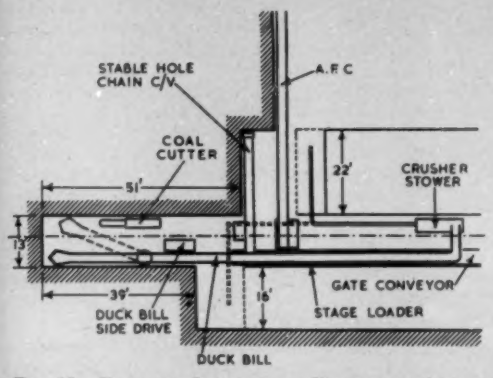


FIG. 10.—PLAN AND LAYOUT OF A HEADING IN ADVANCE OF FACE USING A CRUSHER STOWER.

be sited near the face of the heading and not back in the roadway as illustrated.

Experience has been gained in the division in the use of the crusher stower unit on back rippings, and stowing the dirt made into the face gateside packs. It has also been used for stowing r.o.m. dirt into old roadways and can be adopted for stowing of cavities in roadways. Its main application to stowing gateside packs from roads driven in advance of the face has been proved in Belgian mines and clearly it is this application which offers the greatest contribution, especially when dealing with thin seams. The packs put on are as solid as with any other type of pneumatic stower and far superior to those obtained from normal hand-packing.

Such quality of packing can have a very beneficial effect on the quality of roadways and could lead to the wider use of ribside gates, with consequent reduction in length of stable hole, again an important contribution to efficiency. One unit is to receive trials on a thin face in the division using the system outlined above and it is hoped that this experience will prove useful in developing the technique for wider application.

The "Rippon" Platform

The "Rippon" platform was originally developed in Area 3 of the division by G. G. Heathcote and J. R. Ashley, for use at loader gate face rippings. It consists of the following major components (Fig. 11): (1) Robust platform constructed of steel plate and supported by hydraulic legs to give height variation; (2) telescopic base which can be hydraulically advanced and retracted; (3) hydraulic power pack incorporated in the body of the machine; (4) slusher packing hoist mounted at the rear of the machine and attached to the main framework; (5) slow feed hydraulically driven conveyor built into the body of the platform to feed the slusher packer, and (6) platform mounted on articulated skids which bear on the floor on either side of the stage loader or gate belt structure.

The ripping is fired in the normal manner in one or two blasts on to the platform, which has been previously advanced and set to the correct height underneath the ripping lip. Debris is fed to the slusher bucket which is operated to put on the gateside pack. This apparatus has been found to have the advantages of free access for ventilation and workmen; cables and services to the face which are not exposed to frequent damage; ripping and coaling done simultaneously; an average performance of 5 ft. advance in half a shift appears to be well within the capacity of this equipment, in a 14-ft. by 11-ft. roadway with 7 ft. of ripping; all operations being carried out with a maximum degree of safety, and all face rippings dirt is disposed of in the pit.

While height restriction presently precludes the use of this equipment in the thinner seam sections, work is proceeding on the design of a model suitable for use in seams of from 2 ft. in thickness and upwards. A number of installations are planned for Area 3 and it would be encouraging to see a further expansion of this technique throughout the whole division.

Mechanization and Remote Control of Roof Support Systems

Mechanization of roof support systems has now become firmly established in the division and installations of the Dowty, Gullick, Dobson and Wild types are in general use. The fully mechanized

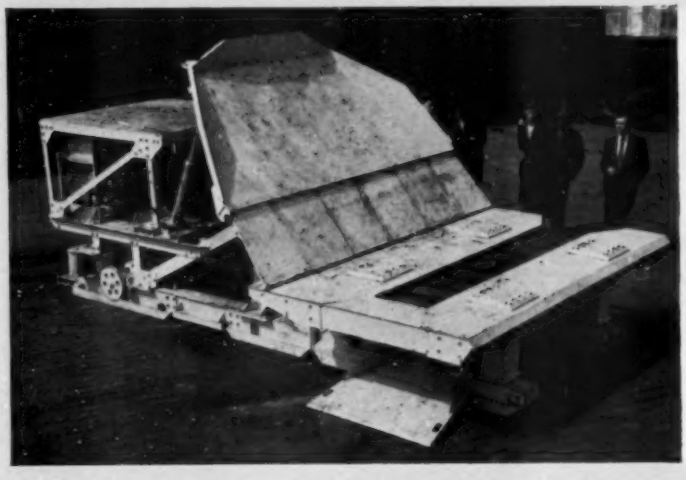


FIG. 11.—"RIPPON" PLATFORM DEVELOPED IN AREA 3, EAST MIDLANDS DIVISION, NCB.

systems employ from three to five operators per shift and further improvement can be effected by doing the work remotely from one control point.

The strata control branch in the division first started to think in terms of remote control of powered supports in 1956 and the problem was submitted to MRE at Isleworth for consideration. The first valve to be tested underground was a pneumatic/hydraulic valve which was fitted to a Seaman-Gullick chock at Measham Colliery in January, 1957.

It was envisaged that by using this valve, every fourth chock would be advanced simultaneously and that, in four operations, all the chocks on the face would be advanced. A major disadvantage was soon found to be the need for two sources of supply, that is an air line in addition to the hydraulic power line. The valve was then modified so as to make it independent of air supply and operated from the hydraulic lines and it was found, by this minor modification, the chocks could be moved over in sequence as they are when manually operated. The principle of the modification is that each valve is operated by hydraulic pistons pressurized from the main pump through a special hose laid along the face.

Stop valves are inserted in this hose operated by means of the pressure in the legs of each chock and the position of the piston in its advancing ram so that, until the chock has advanced and has been re-set, the control pressure cannot pass to the adjacent chock; hence the chocks will operate one after another along the whole length of the face. The conveyor pushing is done separately by a normal face hose, as used on a manual system.

Electrical Monitoring

Five chocks have been operated in this way at Measham Colliery for a trial lasting five months, carried out jointly by engineers from the Mining Research Establishment and strata control branch of the East Midlands Division. Results were satisfactory, although the equipment used was too cumbersome for production use. It is now being withdrawn, because conditions have become very poor and the face has only a short further life.

The current stage is that of obtaining the necessary valves in a form sufficiently practical for larger quantities to be manufactured. Several designs are under consideration and it is proposed to order a dozen of the most suitable, together with monitoring instruments, to permit a larger scale trial.

It is intended to monitor an installation of this system electrically to ensure that any failure to operate correctly is detected immediately. Prototypes of the instruments required for this have been built and tested during the Measham trial. The ram position and the chock leg pressure can be indicated. (These instruments may have other mining uses.) A circuit using transistor relays has been designed so that the signals from up to 250 chocks can be transmitted along only 25 wires.

The sequence can only travel in one direction, but this should be satisfactory on a shearer or plough face. However, to give sequential control in both directions, electric actuation of the valves is being considered. The control valves themselves will be exactly the same, but their pilot cylinders will be fed from solenoid valves, which can then be so small that they can be intrinsically safe, *i.e.*, the valve will be electro/hydraulic.

Instruments used for monitoring the hydraulic system will then be incorporated in the electric control circuit so as to give a similar effect of sequential operation, although in this case individual control of the operations from the gate is also possible. So far, this has only reached the stage of laboratory testing, but development is proceeding, as it is felt that if powered supports are to be used in thin seams they must be capable of automatic remote control.

Remote Control and Automation of Machines

The evolutionary process of mechanization at the coal face is towards the man-free face. The first requisite is the automatic support system already described. To achieve the final result, two further requirements have to be fulfilled: (1) Automatic cable handling for power loaders; and (2) automatic steering of power loaders.

Automatic Cable Handling.—In this connection, an idea originated by the divisional chief electrical engineer, Mr. T. Hughes, has been the subject of development by the Central Engineering Establishment. The principle of the system is illustrated in Fig. 12. Two pulleys, spaced at half the length of the face apart, are coupled together by a hinged

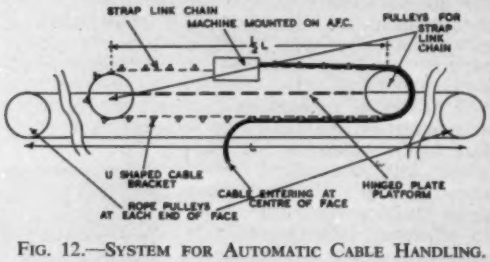

STRAP LINK CHAIN
MACHINE MOUNTED ON A.F.C.
PULLEYS FOR STRAP LINK CHAIN
½ L
U SHAPED CABLE BRACKET
ROPE PULLEYS AT EACH END OF FACE
CABLE ENTERING AT CENTRE OF FACE
HINGED PLATE PLATFORM

FIG. 12.—SYSTEM FOR AUTOMATIC CABLE HANDLING.

plate platform, the edges of which are designed to slide on narrow ledges welded to the vertical side plates of the frame, which is bolted to the goaf side of the armoured flexible conveyor.

A strap link chain, fitted with U-shaped brackets to carry a trailing cable, is passed round the two pulleys and attached to the power loader. The two pulleys are then connected by means of a wire rope passing round pulleys at each end of the face and built into the frame. The trailing cable enters the structure at the centre of the face and lies in the U-shaped guides which allow it to rest on the base of the frame. It is then passed around the intermediate pulley and lies in the U-shaped guides on the upper side of the strap link conveyor to the point where it is anchored to the machine by light cable grips.

In the case of an Anderton shearer flitting along the armoured conveyor at a speed of 40 ft./min., the relative rope speed and hinged platform speed

will be 20 ft./min. The catenary of the strap link chain is supported by the hinged platform and the relative speed of the two is thus 20 ft./min.

Prototype trials have been conducted underground at Mapperley Colliery in Area 5 and further modifications have been undertaken by Central Engineering Establishment as a result. Rope and chain tensions require careful adjustments, but recent work at Central Engineering Establishment now indicates that a production model should shortly be available.

Automatic Steering of Power Loaders.—There are two major methods of achieving the objective of automatic steering of machines. In America, a large degree of success has been achieved by the Union Carbide Company and Joy Manufacturing Company in applying a system of stress gauges to the outer cutting members of a four-borer-head coal tunnelling machine designed for highwall mining. These gauges automatically record the changes in stress imposed on cutting members when cutting in coal compared with rock.

The electrical impulses are fed back *via* an amplifying unit to twin oscilloscopes. These impulses show on the oscilloscope screen in the form of an irregular circular trace. The operator soon learned from the shape and size of the traces whether the seam was rising or dipping and the machine was steered closely to follow the roof. A pair of pendulums send out electrical signals to indicate the inclination of the machine, both fore and aft as well as crosswise. The machine is designed to haul behind it a linked conveyor system and each time the machine was stopped to add a conveyor, an electric drill mounted at the side of the machine was actuated to drill through the rib between the new and completed adjacent tunnel, in order to indicate to the remote operator the rib thickness.

The operator sits in a control cabin at the outbye end of the conveyor system. In front of him are the two oscilloscopes with the machine control buttons on either side. Above him are the wattmeters, voltmeters and speed indicators, etc., and an indicator panel of coloured lights shows whether or not all motors are in operation. The latest machine of this type is designed so as to incorporate continuous extension of the conveyor system to a length of 1,000 ft. with fine accuracy of directional drivage between adjacent tunnels. With the present machine, a production record for two operators per shift is claimed to be 10,375 tons (American) in seven days. The Joy Company is also considering construction of a machine for underground use.

A system for use on longwall machines is being developed by the Mining Research Establishment with full co-operation from the East Midlands Division. This comprises a radioactive source which is designed to emit low energy gamma rays. The source is to be mounted on the machine near floor level and the intensity of reflection of the rays measured on a meter in full view of the operator in the first place. The intensity of reflection will vary according to the density of the reflecting material and a meter will show this variation. Accuracies of at least ½ in. are expected to be achieved in determining the rock/coal interface.

This principle of using the "back scatter" effect of gamma rays is similar to the method evolved by Mining Research Establishment for borehole surveying. The device is to be fitted behind the cutting head of a Midget Miner and the meter will be mounted on the operating end of the machine. The final step in this development will be to feed the impulses from the gamma ray detector *via* an electronic amplifier to electro-hydraulic valves operating the four-jack steering system of the Midget Miner.

While the system is under development in conjunction with the Midget Miner, the intention is ultimately to explore its possible use with other machines. The sensing device is so constructed as to be completely safe as far as operators and other personnel are concerned and can be rendered harmless for replacement purposes. A solid radioactive source, Thulium 170, is being used initially, but investigation is proceeding into the possibility of using a gas which, upon accidental fracture of the container, would become harmlessly dispersed in the natural ventilation stream.

Mining Thinner Seams by Mechanized Methods

Established systems of mining the thinner seams of under 2 ft. 9 in. are by means of pre-cutting and handfilling either on to conveyors or scrapers, flight loading or waffling, scraper boxes, fast ploughs, multi-jib coal-cutters and the Midget Miner. With the exception of the latter, and plough types of machine, none of the above offers performances of the order required to maintain the degree of concentration obtaining in thicker seams, as the rate of production increases from the thinner seam sections.

Midget Miner.—In a paper to the Midland Counties Institution of Engineers, March, 1959, the development of the Midget Miner was described by Mr. L. J. Mills. Since that time, the machine has undergone further minor modifications to steering and guide-bar arrangements and is now consistently stripping 120 yd./day of one shift in a seam thickness of 2 ft. 7 in. Work is also being undertaken to provide an independent automatic hydraulic haulage of the chain type for a higher powered machine. This work is intended to dovetail with the work already being undertaken on automatic steering.

Fast Ploughs.—A number of the Anbauhobel type are now at work in the division, of which two are in the Threequarter seam in Derbyshire and two in the Little Kilburn seam in South Derbyshire, both being thin seams below 2 ft. 6 in.

The degree of success achieved on these installations is largely due to the use of hydraulic jacking as opposed to air jacks normally used. It has been established that with hydraulic line pressures of approximately 350 lb./sq. in., the back thrust of the plough induces pressures of up to 1,000 lb./sq. in. on either side of the plough, thus automatically tending to hold the plough into the face

and maintaining the bite of the plough into the seam.

This action has been established in many installations in other divisions too, with the result that seams judged to be unploughable by previous methods now offer a fair chance of success. Further trials are, therefore, to take place in other thin seams in the East Midlands Division.

Other Thin Seam Machine Developments

The harder and tougher nature of seams generally in the division, and particularly the thinner seams, does not, however, lend great hopes to an extensive application of the ploughing technique. For this reason, interest has largely been centred upon the development of forms of activated ploughing. The early unsuccessful experiments with the Mining Research Establishment autopercussive plough have not diminished this interest.

Attention is being focused upon the wider development of the Huwood slicer with a view to decreasing the depth of slice to, say, 6 in. and increasing the speed of the machine. Experiments on a standard machine have established that with modifications to the slicer head and reduction in throw of the eccentrics from 2 in. to ½ in., greater stability of the machine results with a saving in haulage power. A narrower strip of 10 in. is thus more easily ploughed off the solid. This work is to be used by the manufacturers as a basis for the design of a thin-seam machine in conjunction with an automatic hydraulic haulage. It is intended that the thin-seam model will then form the basic machine for models to fit thicker seams.

Much work is, however, needed if the challenge of effective mechanization of the thinner seams is adequately to be met.

The author wishes to thank Mr. W. H. Sansom, who was production director, East Midlands Division, NCB, for permission to read this paper. Thanks are also expressed to colleagues in the mechanization branch, both at Areas and headquarters, for their help and interest in the preparation of this paper and to those members of the Mining Research Establishment and Central Engineering Establishment whose work is described in this paper. The opinions expressed are those of the author and not necessarily of the National Coal Board.

DISCUSSION

Replying to MR. N. SIDDALL, the AUTHOR said his statement regarding depth of slice was not intended to be taken to the infinitely large or infinitesimally small extremes. At the lower end of the scale the Anbauhobel operated taking a slice of from 2 in. to 4 in., while at the upper end of scale as far as narrow strips were concerned the Anderton shearer took from 18 in. to 30 in. With powered machines, increased depth of web required either increased horsepower or some sacrifice in haulage speed. For powered machines to operate in the thinner seams particularly, the strip taken should be from 6 in. to 12 in. Within this range, high haulage speeds, low power consumption, and suitable sizing of product appeared to lie, and a high degree of concentration would be practicable.

With reference to the slow rate of development of new ideas, much depended on the magnitude of the idea. Where ideas were not too involved from a technical design point of view, then a small staff responsible to the Area mechanization engineer, with drawing office and machine shop facilities such as existed in Mr. Siddall's own Area, appeared to operate quite successfully, and they were able to initiate development quite quickly. Where major design work was involved then the facilities available at the Central Engineering Establishment appeared to be improving at a rapid rate.

Whatever line of approach was adopted, it was apparent that prototype trials with associated mechanical, electrical and scientific assessment of the machine capabilities took some considerable time, especially since suitable measuring instruments were not always available at the colliery and in the Area undertaking trials. Some consideration ought, therefore, to be given to the formation of fully equipped experimental faces in progressive Areas or even to an experimental pit per division.

Tests with Narrow Strips

In reply to a question from MR. H. RODDIS, the AUTHOR said experiments at Donisthorpe Colliery had indicated that the product sizing from a 10-in. strip with the Anderton shearer was greatly improved on that from a 20-in. strip. Much, however, would depend upon the comparative haulage rates and the time taken to flit, as to whether it would be worthwhile to develop a double-ended machine capable of stripping in each direction. In the thinner sections consideration would have to be given to clearance between the underside of the machine and the armoured conveyor when loading in the same direction as the conveyor travel.

A suitable double-ended machine driven by an independent haulage had been developed by Central Engineering Establishment, but was shelved when the large-coal crisis developed. When conclusive evidence on the effects of narrower strips from Anderton shearer loaders had been obtained from headquarters' experiments it might be possible to reconsider this machine. Alternatively, the vertical drum shearer was showing great promise and it was quite probable that a double-ended version of this machine would have a more universal application.

With reference to hydraulic power lines, it was by no means certain that one power line and the use of rams giving a differential thrust resulting from identical pressure feed to each side of the piston, was to be recommended. The possibilities of such a system were being examined. Some work had also been undertaken to produce a single pump capable of delivering two feeds, one at high pressure for chocks, and one at low pressure for rams. One such pump was in use at Granville Colliery in Area 7 on a plough installation, but it needed quite fine adjustment to operate successfully. In the meantime, until more experience had been gained, it would be wise to continue the use of independent pressure lines for chocks and rams.

MR. R. WEBB said that with the Huwood slicer, speeds of the order of 13 ft./min. were obtained. They had been striving to get a slice deeper than 10 in. as they thought thinner slices and faster travel would create problems of cable handling and horizon control.

Replying, the AUTHOR said experiments had proved that with the slicer, reduction in throw from 2 in. to ½ in. had tended to make the machine much more stable on the conveyor and vibration was considerably

reduced. Thus it had been found possible to extract up to 10 in. per slice without pre-cutting. It was not, however, so much in relation to thicker seam installations that these features were vital, but in the development of a machine of this type for thin seams where pre-cutting was impossible. The automatic cable handling device referred to, was also applicable to the slicer, and thus when a thin seam machine was developed, higher speeds and hence higher concentration would be possible. On present slicer installations the relationship between haulage speed and product size was not so vital.

MR. P. L. HARLEY agreed that elimination of ¼-in.-0 coal was vital and asked if the author had any figures of tests with various shearer plough variations. He thought something more might be done with ploughs to prevent re-circulation. Mr. Harley also quoted the high capital cost of installations today and wondered what the author's views were of making the maximum possible use of such costly equipment at the highest efficiency.

Efficiency and Cost of Equipment

The AUTHOR, replying, said that there were no figures available to indicate the degree of degradation caused by re-circulation or by-passing of smalls at the plough of Anderton shearer loaders. Experience of the new design of plough for the "Mawco" had indicated that it was a very efficient form of plough and little or no smalls remained after the flitting run to be cleaned up by hand. Regarding the high capital cost of installations, the recoupment of the investment could only be obtained through a high degree of efficiency. With the exception of very special cases, no mechanized faces had yet been consistently worked on three shifts.

Operators and face men should be thoroughly trained either by mechanization personnel, or by other skilled workmen, for the jobs they were doing. Supervisors, *e.g.*, deputies and overmen, should also be thoroughly acquainted with all aspects of the techniques required, and above all planned maintenance should be properly and systematically carried out. Servicing and cyclic overhauls of equipment should be planned to dovetail neatly into the system so as to eliminate production losses due to breakdowns.

In answer to MR. P. I. ALLSOP, who asked whether face lengths did not affect the results more than was indicated in the paper, the AUTHOR said face length was an important influence on the results obtained. The tendency in the East Midlands had been to sidestep the problem of rippings and stables by increasing the face length, on account of the high degree of concentration that could be achieved with present mechanized methods. In the thicker seams, faces of from 170 yd. to 240 yd. in length were common, but in thinner sections it was unlikely for safety reasons that one could exceed 120 yd. to 140 yd. between two gates. Longer faces in thin seams of 2 ft. 6 in. and under were likely to have to carry three gates. It was certainly true that the most productive and economic faces in the division varied from 180 yd. to 240 yd in length in seam sections from 3 ft. to 5 ft. Below 180 yd. in length the effect of stable hole and ripping manpower had an adverse effect on performances.

MR. J. H. R. COPE said that reference had been made to the high capital cost of installations. Many people were aware of the introduction some years ago of American systems of mining to this country. He asked if it would not be possible to get a higher return from this investment if more of this type of mining was practised instead of longwall methods.

Replying, the AUTHOR said the general performance of American type of room-and-pillar machinery in Britain, and certainly in the East Midlands Division, was by no means as high as that achieved in the US, mainly on account of differing physical conditions and the need for more concentrated support systems. Some deep consideration was presently being given in the US to the use of the longwall method with fully mechanized systems of support and extraction in retreating work. In the thicker seams in the East Midlands Division, *i.e.*, those over 3 ft. 6 in. thick, a combination of the American type machines for rapid development and fully mechanized longwall retreating panels might have something to offer. The distance retreated would have to be carefully considered in terms of the time interval during which the developed roadway would stand in reasonable condition, which from past experience with American systems was not great in the majority of seams. In the author's opinion the advance heading technique combined with crusher stowing of the ripping dirt had much to offer, particularly if applied to a fully mechanized face.

MR. R. SCOTT, referring to Table 1, spoke of double tonnage but only small increases in o.m.s. figures. He asked if this was due to fuller mechanization, less selectivity in choice of faces, or lower quality supervision. Replying, the AUTHOR said that obviously since the division was obtaining more than 50 per cent. of its coal face output from mechanized faces, the best propositions for face mechanization had been taken up, and in many Areas it was very much more difficult to select faces considered to be suitable for mechanized methods. Again, the high rate of expansion which had taken place, and the large numbers of installations had resulted in some time-lag before the full benefits of mechanization were attained. The slower rate of expansion during the first six months of 1959 had allowed some consolidation to take place, and the "settling down" period for new installations was tending to reduce as a result of wider general experience at the majority of collieries.

Increased Application of Trepanners

In reply to a question by MR. W. SHARPE, the AUTHOR confirmed that the majority of the increased tonnage obtained in the first six months of 1959 had resulted from the wide application of the trepanner, as also had the better o.m.s. figures obtained. The Anderton shearer should not, however, be underrated as a power loader in seams of suitable marketing quality, and it still rated as a highly efficient machine in all respects. The performance of the Anderton shearer was still slightly ahead of the trepanner, both in terms of bulk output and o.m.s., although in the last six months the gap between the two machines had narrowed considerably.

Replying to MR. R. HAMILTON, the AUTHOR said the normal speed of the Anbauhobel was approximately 78 ft./min., and the depth of slice taken depended largely on the physical properties of that portion of the seam attacked by the plough, together with the pressure exerted by the rams, but varied under most conditions between 2 in. and 4 in.

Before the use of hydraulic rams had become widespread in conjunction with ploughs, it had been found that with soft floors the plough had a marked tendency to dig into the floor. The use of hydraulic rams, and the influence of the induced high pressure of up to approximately 1,000 lb./sq. in., at the point of the plough passing each ram, had tended to help maintain horizon as well as increasing the number of applications where both harder coals and conditions of soft floor could be attempted.

FORTHCOMING EVENTS

FEBRUARY 29

Royal Society of Arts: Meeting at the society headquarters, John Adam Street, London, W.C.2, at 6 p.m.: "Natural and Manufactured Gas," the last of three Cantor lectures entitled "The Fuel and Power Industries and National Prosperity," by A. Parker.

MARCH 3

Midland Institute of Mining Engineers: Meeting at the Royal Victoria, Sheffield: "Methane Drainage," by E. White and A. Wright.

MARCH 9

North Wales Metallurgical Society: Meeting at the Flintshire Technical College, Connah's Quay, Nr. Chester, at 7 p.m.: "Physical Chemistry of Steelmaking," by J. Pearson.

Sheffield University Mining Society: Meeting at the Central Engineering Establishment, NCB, Stanhope, Bretby (Derbys): "Tunnelling," by K. L. Stretch.

MARCH 11

Normanton, Castleford and District Mining Society: Meeting at the Whitwood Technical College, Castleford, at 7 p.m.: "Whitwood Colliery Reconstruction," by J. Hilton.

Southern Counties Institute of Mining Engineers: Meeting at the headquarters of the Institution of Mining Engineers, 3, Grosvenor Crescent, London, S.W.1: "New Geophysical Method for the Exploration of Undersea Coalfields," by A. C. Maries and W. C. Beckmann.

MARCH 14

Institution of Production Engineers: Annual general meeting at the Grand Hotel, Sheffield, at 6.30 p.m.: "Mechanical Handling in the Heavy Steel Industry—Steelmaking, Rolling, and Forging Processes to the Completion of the Product," by H. R. Mills.

MARCH 16

Mining Institute of Scotland: Meeting at the Mining Laboratories, 79, Grassmarket, Edinburgh: "Human Relations in the Mining Industry," by L. R. Milligan.

Midland Counties Institution of Engineers: Meeting at the Mines Rescue Station, Ashby-de-la-Zouch: "Ventilation Phenomena connected with the stopping of Mine Fans," by J. D. Jones and F. B. Hinsley.

Institute of Welding (North London Branch): Meeting at 54, Princes Gate, London, S.W.7, at 7 p.m.: "Improved Steels and their Weldability," by J. F. Wilkinson.

MARCH 17

South Wales Institute of Engineers: Meeting at the Institute Buildings, Park Place, Cardiff, at 6 p.m.: "Large Diameter Boreholes for Ventilation and Stable-shaft Sinking," by J. H. Pedley.

MARCH 18

West of Scotland Iron and Steel Institute: Meeting at 39, Elmbank Crescent, Glasgow: "Technical Factors in the Production of Iron by Methods other than the Blast Furnace," by J. Taylor.

MARCH 22

Combustion Engineering Association (Scotland): Meeting in Glasgow: "Industrial Use of Gas," and "Problems of the Packaged Boiler."

MARCH 23

Institute of Fuel: Meeting at the Institution of Civil Engineers, Great George Street, London, S.W.1, at 5.30 p.m.: "New Process for Briquetting Coal without a Binder," by H. R. Gregory.

MARCH 24

Coke Oven Managers' Association (Northern Section): Meeting at the Three Tuns Hotel, Durham, at 7 p.m.: "Elimination of Dust and Drizzle from Quenching Towers," by E. R. Wapie, W. C. Ingleby, and R. Jackson.

National Association of Colliery Managers

FEBRUARY 29

Midland Branch: Special meeting at the new Technical College, situated at the junction of Derby Road and Nottingham Road, Mansfield, at 6.30 p.m.: "Mining Explosions."

MARCH 4

Lancashire Branch: Annual dinner/dance at Pack Horse Hotel, Bolton.

MARCH 8

Yorkshire Branch: Meeting at Brodsworth: "Economical Use of Power at Collieries," by M. V. Kelly.

MARCH 14

Midland Branch: Meeting at the Denman's Head, Sutton-in-Ashfield, at 6.30 p.m.: Paper by C. Round.

MARCH 25

Kent Branch: Meeting at the Swan Hotel, Deal, at 7.15 p.m.: "Coal Preparation," by F. H. Price.

Hydraulic Tub Loader

AN automatic tub loader for use at cage and conveyor loading points has been developed in the Northern (N & C) Division, National Coal Board, by Mr. W. C. BEST, manager of No. 2 Area Central Workshops. The loader consists of a hydraulically actuated roller-chain-coupled ram with interlocking stops. The ram is bogie mounted, the actuating mechanism being located beneath the tub track.

Attached to the respective ends of the ram are the ends of the roller chain, which are carried around idler wheels mounted beneath the tub tracks and distanced not less than the amount of travel required of the ram. The chain passes over a driving sprocket and is suitably deflected by idler sprockets, one mounted on each side. The driving sprocket is rotated by a hydraulically operated rack and pinion. The rack is mounted between the pistons of two horizontally mounted opposed cylinders bolted to a gearcase through which the rack passes to operate the pinion in the gearcase. The pinion is integral with the shaft on which the driving sprocket is mounted outside the gearcase and the design is such that the ram travel, that is, the chain travel, is four times the piston travel.

The hydraulic system which operates the ram also serves two sets of interlocked stops which control the number of tubs being dealt with by the loader. The normal arrangement is to ram two tubs at one time. The hydraulically operated stops are so arranged that when one is in the stop position the other is in the pass position. When the ram commences its return stroke the front stops are raised and the rear stops drop to allow the following tubs to gravitate forward until they meet the forward stop which holds them ready for the next operation.

Use of the loader saves the labour of three men compared with manually operated shaft stations and greatly reduces the cage decking time.

NEW US TUNGSTEN-MOLYBDENUM SEPARATION PROCESS

FUSED-SALT-BATH electrolysis, a new and simple method recently developed by the United States Bureau of Mines for selectively extracting tungsten and molybdenum from domestic mineral concentrates, is described in a recently issued technical publication. The process promises to reduce costs of producing tungsten of acceptable grade and molybdenum-metal powders from concentrates containing both metals.

The bureau's report (No. 5554), "Electro-winning Tungsten and Associated Molybdenum from Scheelite," covers in detail its laboratory work and bench-scale experiments in which commercial-grade tungsten and molybdenum powders were selectively recovered from typical scheelite concentrates in a one-step operation.

Refresher Courses for Metallurgists

THE Department of Metallurgy, Battersea College of Technology, S.W.11, has organized refresher courses for metallurgist graduates to be given at the College during the Easter and Summer Vacations in the current session. The courses will last 3 to 4 days.

The first courses planned will be, "The Structure of Metals and Alloys," Easter vacation, April; "Developments in Foundry Practice," summer vacation, July; "Austenite Transformation—The Present Position," summer vacation, September.

The Shaking Ladle

A NEW METALLURGICAL TOOL

By SVEN EKETORP

The shaking ladle has been developed at the research department at Domnarvet, in Sweden, where its use for different metallurgical operations has been studied. The shaking ladle makes possible an intense mixing action of the metal in the bath and also ensures intimate contact between the molten metal and solid or gaseous additions. The ladle should be ideal in all instances where a good stirring action in the bath is required. In steelworks it will be more advantageous in use than the rotating furnace formerly used for desulphurization. The following abridged translation is from "Jernkontorets Annaler," 1959, No. 8.

IN recent years it has become increasingly recognized that stirring or mixing is important in carrying out metallurgical reactions with rapidity. In many instances in order that a desired reaction shall occur it is not sufficient to ensure that the thermodynamic conditions are adequately fulfilled; it is also necessary to see that the rate of the reaction is maintained by delivering or withdrawing the substances which take part in the reaction, in a sufficiently rapid tempo and from the reaction zone. Mixing on the one hand promotes an increase in the interface area on the phase boundaries, and on the other a levelling out of the concentration gradients within the various existing phases.

Mixing is especially important in creating contact between a solid, pulverized substance and molten pig-iron, such as occurs during desulphurization of pig-iron with lime or calcium carbide. In this instance the rapidity with which the desulphurization takes place is entirely dependent on the degree of contact established between the desulphurizing medium and the pig-iron. Some 10 years ago in the research department at Domnarvet, Bo Kalling and his collaporators evolved a desulphurization process, whereby pig-iron is brought into intimate contact with powdered lime in a rapidly revolving, rotating furnace.[1, 2, 3]

Principle of the Shaking Ladle

A horizontal rotating furnace is in itself a simple enough piece of machinery, but its application in iron and steel works has met with certain difficulties, *inter alia* because it holds a relatively small amount of pig-iron and is therefore difficult to operate, especially in steelworks where the introduction of an operation which makes heavy demands on time and labour within the framework of existing stages of treatment can create difficulties.

It is clear, therefore, that a more readily workable piece of machinery is desirable, and the so-called shaking ladle had its origin against this background. The first experiments with this apparatus were carried out in February, 1958, and in the period which has ensued, the results which can be achieved in the shaking ladle have aroused great interest in many quarters.

The principle on which the shaking ladle is based has been employed for a long time on a short scale. It is the same movement of liquid which takes place when a glass of water is shaken in the hand, in such a way that the glass describes a small circle by its movement, but without the glass itself turning about its own axis. The installation for this purpose will be described later on, but first the movement which is imparted to the liquid in a vessel in this way will be discussed.

When a vessel is set in motion eccentrically, the surface of the bath "swirls" round without creating any greater degree of mixing; however, up to a certain number of revolutions per minute, *i.e.*, the "critical number of cycles," when a unique wave motion occurs which is like the breaking of the crest of a wave in the sea, and it is quite obvious that when such a wave is set up, entirely different and much more favourable conditions of circulation are obtained than at lower numbers of revolutions. It is true, of course, that under given circumstances a certain amount of mixing occurs in the liquid through the fact that it moves in relation to the wall of the vessel.

Above the critical number of revolutions per minute the height of the wave will increase, but beyond a certain point the mixing action becomes less. Experience with the 3-ton ladle used experimentally showed good mixing at between 50 and 100 mm. eccentricity at 50 r.p.m.

Metallurgical Applications of the Shaking Ladle

The shaking ladle has shown itself to be an outstanding metallurgical tool, in all instances where it is a matter of achieving good mixing, whether this applies to the actual bath of pig-iron or steel, or to the creation of good contact between the pig-iron and a solid, molten or gaseous reaction agent.

In the following text a description will be given

TABLE 1.—*Desulphurization of Pig-iron in the Shaking Ladle.*

Melt No.	Pig-iron, tons.	Lime, per cent.	Coke breeze, per cent.	Soda, per cent.	Eccentricity, mm.	No. of revs. per min.	Shaking time, min.	C, per cent.	Si, per cent.	S, per cent.
SK3 ..	2.1	2.3	1.0	—	61	70	0	3.45	0.42	0.078
							5	3.75	0.35	0.027
							10	3.75	0.34	0.012
							15	3.90	0.31	0.009
							20	3.90	0.31	0.007
							30	3.90	0.31	0.003
SK6 ..	2.6	1.5	0.6	—	61	70	0	3.50	0.40	0.213
							5	3.70	0.35	0.055
							10	3.74	0.34	0.032
							20	3.79	0.34	0.020
							30	3.88	0.32	0.013
SK9 ..	2.3	1.7	0.7	0.10	61	75	0	3.46	0.07	0.163
							5	3.48	0.03	0.042
							10	3.62	0.02	0.020
							20	3.62	0.02	0.011
							30	3.62	0.02	0.009
SK61 ..	2.5	1.6	0.8	0.08	79	60	0	4.32	0.53	0.052
							10	—	—	0.007
							15	—	—	0.004
							20	4.34	0.53	0.004

of some typical spheres of application, the results of which were obtained during experiments in the research department at Domnarvet in a shaking ladle of about 3 tons capacity.

Desulphurization of Pig-iron.—During the desulphurization of pig-iron, apart from the maintenance of reducing conditions, as intimate contact as possible is required between the pig-iron and the finely pulverized burnt lime. In Table 1 is recorded the results from the desulphurization of several melts, during which the degree of desulphurization in all instances was about 95 per cent. As may be seen, the sulphur content can be brought down to about 0.010 per cent. S, even where the initial contents are as high as about 0.2 per cent.

During two of the charges recorded a small quantity of sodium carbonate was added, when it was shown that the soda prevents the lime from adhering to the walls of the ladle, and at the same time reduces the quantity of iron splashes (drops of pig-iron) in the powdered lime. The temperature of the pig-iron during the experiments mentioned was about 1,250 deg. C.

The loss in temperature, with which one must reckon in the shaking ladle, is less than for the corresponding desulphurization in the rotating furnace, partly because the shaking ladle can be well insulated, and partly because it can be made to smaller dimensions for the same capacity than a rotating furnace. It is of interest to see that desulphurization of the pig-iron proceeds just as well at low contents of Si. In melt SK9 the final Si content was only 0.02 per cent., and the principal reducing agent must in this instance have been carbon. It can thus be said that desulphurization proceeds very well in the shaking ladle with normal quantities of lime, and low sulphur contents result.

Carburization and Alloying of Pig-iron.—Carburization of pig-iron in an ordinary ladle is difficult to carry out and gives unsatisfactory results. In order that carburization with solid carbon shall be successful, a very good mixing action is required, so that the carbon really comes into contact with the pig-iron.

Like the Kaldo rotating furnace,[4] the shaking ladle has shown itself to be very suitable for car-

TABLE 2.—*Carburization and Alloying in the Shaking Ladle.*

Melt No.	Pig-iron, kg.	Additions.	Time, min.	Temp., deg. C.	Analysis.			Yield.			Remarks.
					C. per cent.	Si. per cent.	Mn. per cent.	C. per cent.	Si. per cent.	Mn. per cent.	
1	2,300	45 kg. coke ..	0	—	2.70	0.22	0.04				Excess of coke.
		59 kg. FeSi (45) ..	2	—	2.94	1.38	0.71				
		20 kg. FeMn (80)..	4	—	3.34	1.34	0.71				
			9	1,280	3.48	1.33	0.70	64	101	100	
2	2,875	60 kg. coke ..	0	—	3.28	0.43	0.37				
		120 kg. FeSi (45)	10	1,255	3.89	2.07	0.93	57	95	112	,, ,,
		20 kg. FeMn (80)..									
3	2,660	25 kg. coke ..	0	—	3.72	0.72	0.43				
		100 kg. FeSi (45)	10	—	3.78	2.35	0.93	—	103	93	,, ,,
		20 kg. FeMn (80)..									
4	2,840	10 kg. coke ..	0	1,310	3.50	0.25	—				
		12 kg. FeSi (45) ..	5	1,250	3.72	0.40	—	84	80	—	
5	2,690	130 kg. FeSi (45)..	0	1,340	4.30	0.46	—				Graphite precipitation.
			5	1,285	3.98	2.33	—	—	91	—	
6	2,820	125 kg. FeSi (45)..	0	1,285	3.98	2.33	—				
			5	1,265	3.43	4.22	—	—	104	—	,, ,,

burization of pig-iron, especially when not connected with any refining process. In Table 2 data are given for carburization of melts, some of which were simultaneously alloyed with additions of both 45 per cent. FeSi and 80 per cent. FeMn. Coke breeze can be used as a carburizing medium. The shaking period which was used in the experiments normally lasted 5-10 min.

Normally it should be possible to count on a carbon yield of about 80 per cent. during carburization, with the provision that the temperature of the pig-iron is sufficiently high. Other carburizing agents, apart from coke breeze, for instance graphite electrode scrap, can be considered under given conditions.

During carburization one must always reckon on a considerable loss in temperature. With an addition of coke containing 80 per cent. C and a C yield of 80 per cent. we must reckon on a minimum loss of temperature of 80 deg. C. per 1 per cent. C. Since it is very important to maintain the temperature of the cast-iron at a sufficiently high level, the idea is worth consideration that a small quantity of oxygen should be blown in during carburization and alloying, but on the other hand under given circumstances it must be taken into account that there will be a lower yield from the additions, and likewise that the conditions for any subsequent desulphurization will be worsened.

Refining of Pig-iron to Remove Silicon and Vanadium.—Refining of pig-iron to remove silicon and vanadium can be carried out in a stationary ladle with oxygen blowing through a lance, but such a method has great disadvantages, above all because the degree of mixing in the bath of pig-iron is inconsiderable, which produces the result firstly that the content of silicon in the bottom of the ladle is considerably higher than at the surface of the metal, and secondly that the temperature of the pig-iron in the upper part of the bath is consequently higher than the mean temperature, and for this reason in this part of the bath there is likewise a certain amount of carbon combustion.

Refining can be carried out in this respect in the shaking ladle with great accuracy through the intensive mixing action. A series of experiments were

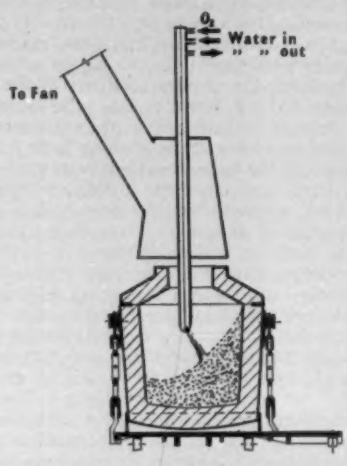


FIG. 1.—WASTE-GAS HOOD AND WATER-COOLED OXYGEN LANCE SHOWN IN POSITION ABOVE THE BATH.

conducted, during which the shaking ladle was equipped with a waste gas hood and a water-cooled oxygen lance above the bath of iron (Fig. 1). The results of the three trial blows to remove silicon are summarized in Table 3. A good indication that the mixing is effective is that the drop in the carbon content was only very moderate, despite the fact that the Si content sank from over 1 per cent. to less than 0.10 per cent.

TABLE 3.—*Pre-blowing of Basic-Bessemer Pig-iron in the Shaking Ladle.*

Melt number.	Pig-iron, kg.	Ore or sintered carbon, kg./ton.	Lime, kg./ton.	O_2, Nm^3/ton.	Time, min.	Temp. deg. C.	Analysis. Pig-iron. C per cent.	Pig-iron. Si per cent.	Pig-iron. Mn per cent.	Slag. FeO per cent.	Slag. SiO per cent.	Slag. CaO per cent.
8F1	2,300	—	—	—	0	1,280	3.60	1.29	0.70	—	—	—
		—	22	4.9	3	—	3.60	1.16	0.70	4.4	41.8	40.8
		—	22	5.0	6	1,445	3.46	0.92	0.70	4.6	34.1	48.5
		5	22	9.3	11	—	3.24	0.41	0.65	2.3	41.0	42.1
		—	22	11.0	16	1,545	3.00	0.03	0.40	3.1	39.6	40.3
8F3	2,050	5	88	30.2	16							
		—	—	—	0	1,260	3.52	1.11	0.87	—	—	—
		—	—	5.0	3	—	3.48	1.06	0.82	35.6	34.8	6.9
		—	—	3.7	5	1,290	3.52	0.99	0.76	43.6	32.9	—
		10	—	5.0	8	1,410	3.50	0.62	0.49	35.2	38.9	—
		10	5	5.0	11	1,375	3.44	0.31	0.26	36.5	34.6	—
		10	—	4.7	13	1,440	3.36	0.09	0.09	31.6	32.3	4.5
8F4	2,100	30	5	23.4	13							
		—	—	—	0	—	3.50	1.33	0.44	—	—	—
		—	—	6.2	3.3	1,350	3.47	1.07	0.77	33.9	41.5	1.8
		10	5	6.2	6.6	1,410	3.40	0.65	0.50	23.0	41.6	10.9
		15	5	6.0	9.8	1,460	3.36	0.37	0.31	33.4	36.4	8.4
		20	—	5.8	12.9	1,430	3.30	0.05	0.09	35.2	35.6	7.6
		45	10	24.2	12.9							

The yield of oxygen calculated on the basis of oxidation of silicon during the melts mentioned here lies at a very low level, at about 30 per cent., which should mainly be due to the fact that the delivery of oxygen was as great as about 4 cub. m./min., which is a high value for this small furnace unit. One can expect to achieve a higher yield, when a closer study has been made of the influence of such factors as the height of the lance above the bath, the angle of delivery of the oxygen in relation to the furnace axis the quantity of oxygen delivered in unit time, the eccentricity and the number of cycles of the shaking ladle. By mixing in the shaking ladle, localized high temperatures in the bath are avoided during refining with oxygen, but precisely for this reason it is possible that the yield of oxygen is lower than during conventional blowing with a lance.

Experiments have likewise been carried out in the shaking ladle with preliminary blowing with oxygen to remove vanadium. During these experiments, on the one hand, a basic-Bessemer pig-iron with a low vanadium content, and on the other hand, a pig-iron with a high vanadium content of about 0.7 per cent. V were blown. The values obtained from pre-blowing of a basic-Bessemer pig-iron with a low vanadium content are reproduced in Table 4. During this melt cooling was carried out with 2.3 per cent. ore (71 per cent. Fe) and with 0.3 per cent. burnt lime, so that a temperature of the pig-iron of 1,200-1,250 deg. C. was maintained. Table 5 records the results with a pig-iron with a high vanadium content. In this instance, cooling was carried out with cold pig-iron of the same analysis as the original pig-iron, and it was possible to add 29.5 per cent of this pig-iron to keep the temperature at about 1,300 deg. C.

It is clear from the two experiments that it is possible to keep the carbon content as good as constant during refining in respect of silicon and vanadium. It was possible to slag off 88 and 83 per cent. of the vanadium respectively, and the vanadium contents of the final slag were 4.6 and 8.7 per cent., respectively.

TABLE 4.—*Pre-blowing of Basic-Bessemer Pig-iron in the Shaking Ladle to Remove Vanadium. Melt V-102.*

Sample No.	Pig-iron.					Slag.		
	C.	Si. per cent.	Mn. per cent.	V.	Fe.	V. per cent.	SiO_2. per cent.	MnO.
1 ..	3.68	0.41	0.85	0.16	—	—	—	—
2 ..	3.68	0.30	0.61	0.10	31.8	3.55	16.2	18.3
3 ..	3.68	0.19	0.46	0.10	33.9	3.80	16.4	17.8
4 ..	3.66	0.13	0.27	0.06	32.7	3.90	16.6	17.5
5 ..	3.64	0.08	0.18	0.02	28.6	4.55	18.8	18.9

Construction of the Shaking Ladle

The experimental plant which is being used at the present time in the research department at Domnarvet was constructed in accordance with the design which is shown in Fig. 2. A base plate, A, can be set to rotate by means of a crown wheel about the bearing B. Above this plate, a disc, C,

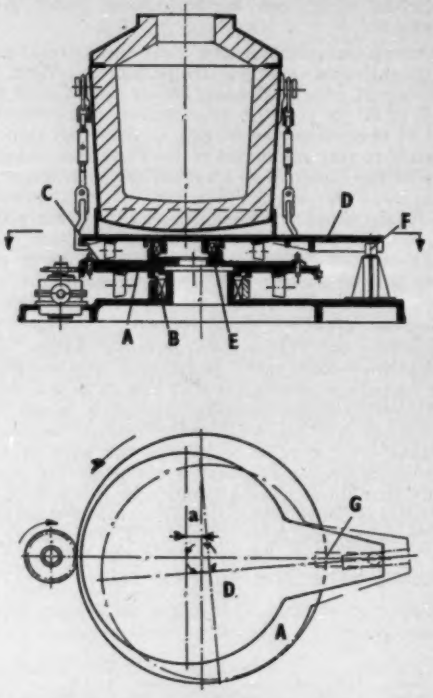


FIG. 2.—DESIGN OF EXPERIMENTAL PLANT AT DOMNARVET.

TABLE 5.—*Pre-blowing in the Shaking Ladle to Remove Silicon and Vanadium. Melt V-105.*
Weight of pig-iron, 2,394 kg.

Sample number.	Oxygen, Nm^3	Cold pig-iron, kg.	Temperature, deg. C.	Pig-iron.					Slag.		
				C per cent.	Si per cent.	Mn per cent.	S per cent.	V per cent.	Fe per cent.	SiO_2 per cent.	V per cent.
1	—	—	1,310	4.30	0.54	0.10	—	0.60	—	—	—
2	10	76	1,310	4.33	0.43	—	0.037	0.53	40.0	19.1	2.9
3	10	80	1,320	4.32	0.37	—	—	0.47	33.1	21.5	6.5
4	10	113	1,315	4.29	0.27	—	—	0.39	34.5	20.6	7.3
5	10	152	—	4.32	0.25	—	—	0.36	36.5	19.7	7.6
6	—	—	1,290	4.29	0.23	—	—	0.32	35.9	20.6	8.1
7	10	126	1,280	4.27	0.20	—	—	0.29	37.8	19.2	8.2
8	10	75	1,300	4.30	0.12	—	—	0.20	40.8	18.2	7.9
9	10	82	1,280	4.25	0.09	—	—	0.14	43.0	17.0	7.7
10	—	—	1,280	4.27	0.07	—	—	0.10	40.2	18.7	8.7

Samples 6 and 10 were taken after only 2 minutes shaking, without oxygen blowing.

is set more or less eccentrically, at for instance a distance a. The disc, D, on which the ladle is placed, can in its turn rotate centrically about the bearing, E, by means of its rollers. The disc D and the ladle are prevented from rotating about their own axes, by the fact that the disc D can move backwards and forwards around the fixed point F along the channel, G, during the rotation of the plate A. The movement which is imparted to the centre of the ladle will under such circumstances be a purely circular motion, but since the ladle plate is fixed at one point, all other points on the ladle describe ellipses.

Many different designs can be devized to bring

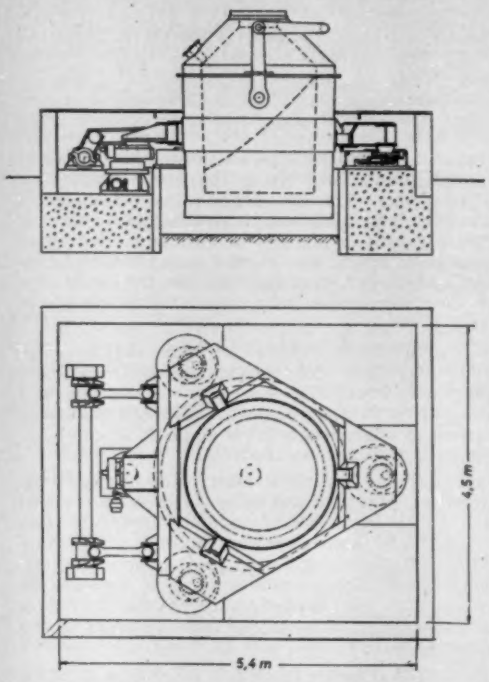


FIG. 3.—GHW SYSTEM OF 15-TON SHAKING LADLE.

about the movement of the shaking ladle, but for the time being the most interesting is certainly that which has been proposed by the Gesellshaft für Hüttenwerksanlagen (GHW) in Germany (Fig. 3). Here, the shaking mechanism is so arranged that the ladle can be lowered onto it, without the necessity for locking it securely other than by passing three lugs into three slots in the framework. This framework is located at three points on heavy ball bearings, and the framework with the ladle placed upon it can be made to travel along its circular track by means of an eccentrically placed pivot, which in this instance is therefore not stressed. The framework is held in position by means of a special parallelogram linkage. The eccentricity and the number of revolutions can be regulated.

In order to facilitate pouring of the pig-iron after treatment a pouring spout is placed in the nose of the ladle (Fig. 4). By this means it is possible to prevent the powdered lime from flowing out with the iron, and casting can take place from the shaking ladle directly into a casting machine or casting moulds. During treatment the pouring spout is blocked with a stopper. After tapping the iron the ladle is placed vertically with the mouth downwards to tap off the lime powder.

One of the most important advantages of the shaking ladle is that it is so easy to operate during production practice. In principle, ordinary ladles could be used, on condition that they are provided with a conical hood. A hood is necessary during the desulphurization process in order to create distinctly reducing conditions in the ladle, and in order to collect the fumes during refining with oxygen. Likewise under given circumstances during shaking there must be a hood to prevent the pig-iron from being thrown out of the ladle. The ladle can be placed on, and lifted up from, the shaking platform with normal ladle cranes.

An important advantage of the shaking ladle by comparison with the rotating furnace is that it can be constructed with much smaller dimensions for an identical capacity, and is therefore cheaper. The height to which the wave will rise up in the ladle, when the number of cycles is just at the critical point, is 1.4 times the height of the bath when at rest. For practical purposes it can be calculated that the maximum height of the bath during rotation is 1.6 times the depth of the bath when at rest. The ladle may thus be filled to about two-thirds capacity. In a rotating furnace it is necessary to have a furnace volume of 0.5-0.6 cub. m. per ton pig-iron, whereas the corresponding value for the shaking ladle is 0.25-0.3 cub. m. per ton.

The shaking ladle can be constructed with good insulation, which is difficult with a rapidly turning rotating furnace, since the stresses are truly considerable when the whole furnace is rotating horizontally. Since the shaking ladle does not itself rotate about its own axis, but is only moved round in a small circular path, the stresses on the refractory brickwork in this instance are not great, and since the shaking ladle can be effectively insulated,

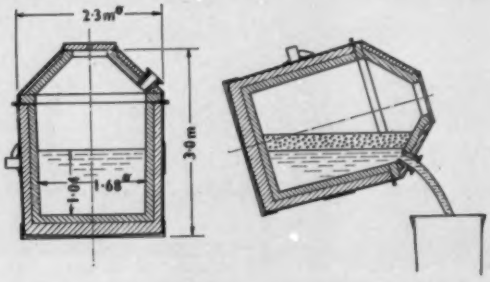


FIG. 4.—TAPPING SPOUT ON THE SHAKING LADLE.

it can be fabricated for small capacities, *inter alia* for a weight of less than 5 tons of pig-iron. Fig. 5 shows the dimensions and weights of shaking ladles of 3 to 80 tons capacity.

Use of the Shaking Ladle during Production

Desulphurization of pig-iron with lime powder has not yet been introduced at steelworks to the extent which might have been expected in view of the results which could be obtained by this process. The reasons for this are that the rotating furnace is much too difficult to handle, and that the transport times are therefore all too long. By means of the shaking ladle the process is placed in a new and better position.

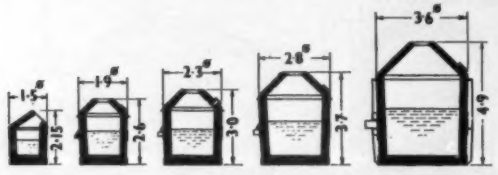
At present, design work is in hand with shaking ladles of capacities up to as much as 80 tons pig-iron capacity. From the metallurgical point of view desulphurization in the shaking ladle does not distinguish itself from that in the rotating furnace, but from the economic aspect it should be somewhat cheaper. For steelworks, the ability to refine pig-iron to remove silicon in the shaking ladle should likewise be of interest. But the sphere in which the shaking ladle should find direct application is in foundries, for improving second grade pig-irons to produce high quality hematite pig-irons.

In order to produce a quality pig-iron, at the present time it is necessary to use a greater or lesser quantity of hematite pig-iron in the cupola furnace, but with the ability to adjust the analysis at a later stage it is possible to charge the cupola furnace with a large quantity of steel scrap, which reduces the cost of materials for the melt in a decisive manner.

Through experiments in the research department it has been shown that it is quite possible to achieve such changes in the analysis in the shaking ladle, and as an example may be cited the following two analyses before and after treatment:

Per cent.	Before.	After.
C	3.28	3.78
Si	0.43	2.05
Mn	0.37	0.91
S	0.059	0.006

By means of a shaking ladle in combination with a cupola furnace, a basic iron with low carbon and silicon contents can be produced in the cupola furnace, and the desired analyses subsequently attained through later adjustment in the shaking ladle.



(*a*) 3 ton 8 ton 15 ton 30 ton 80 ton
(*b*) 4.2 ton 8.5 ton 13 ton 20 ton 40 ton

FIG. 5.—WEIGHT AND DIMENSIONS OF LADLES OF VARIOUS CAPACITIES. (*a*) STEEL CAPACITY; (*b*) LADLE WEIGHT INCLUDING LINING.

TABLE 6.—*Comparative Calculation of the Production of First Quality Cast Irons in Cupola Furnaces With and Without the Shaking Ladle.* Prices and costs in DM. Annual Production 24,000 tons moulds.

	Existing.	With shaking ladle.
Cupola charge:		
First grade pig-iron (per cent.)	50	
Mould scrap (per cent.)	50	50
Steel scrap (per cent.)		50
	DM/ton.	DM/ton.
0.5 ton pig-iron at 318.00	159.00	
0.5 ton scrap 175.00		87.50
11.5 kg. FeSi (75 per cent.) 1000.00		11.50
3.2 kg. FeMn (78 per cent.) 1280.00		4.10
10.0 kg. coke breeze 60.00		0.60
	159.00	103.70
Treatment in the ladle:		
20.0 kg. lime at 60.00		1.20
Wages, 2 men at 12,000 per year		1.00
Electrical power		0.10
Repairs		0.50
Amortisation		1.00
		3.80

Total saving: 51.50 DM/ton.

From the economic aspect this possibility is important, above all because steel scrap can thereby replace expensive pig-iron in the melt. During an assessment which was carried out for a German works which produces ingot moulds for steelworks, the cost calculation worked out as is shown in Table 6.

This method—a combination of an acid hot blast cupola furnace and a shaking ladle—will be appreciably cheaper than to produce the iron in a basic cupola furnace, in which, indeed, it is likewise possible to attain low sulphur contents in combination with high carbon contents.

In Germany an initial pilot plant has been installed at Mannesmann-Meer in München-Gladbach, and very important results have already been obtained with both desulphurization and alloying. At the same works a 15-ton plant is now planned. The shaking ladle is now coming to replace the forehearth of the cupola furnace, in order to reduce the temperature losses during the operation to the maximum extent.

The author wishes to express his thanks to Stora Kopparbergs Bergslags, AB, for permission to publish these results. Prof. Bo Kalling, who produced the basic idea for the shaking ladle, has given valuable advice and comments during the course of the work. Recently, intensive development work in this sphere has been carried out by Gesellschaft für Hüttenwerksanlagen in Düsseldorf, and especial thanks are due to Mr. S. Tunder.

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STEEL-BAND COOLING CONVEYOR

Development in Pitch Production

CONVENTIONAL practice in the production of pitch involves the use of large beds in which the molten liquid is allowed to cool to the solid state. At the Beckton Tar and Ammonia Products Works of the North Thames Gas Board the crude tar distillation plant consists mainly of two continuous pipe-still units, each capable of producing about 200 ton/day of coal-tar pitch.

The pitch leaves these plants as a liquid at about 200 deg. C., and the prevailing practice has been to blow it through steam-jacketed mains into sunken beds (Fig. 1) about 8 ft. deep, each with a capacity of about 5,000 tons. The pitch cools slowly during several months in these beds to a solid, which is later broken up, dug out, and loaded into trucks by mechanical digger.

During the past 10 years the Products Works, occupying an area of nearly 100 acres, has been reconstructed and modernized. Recent additions to the tar processing section have included two Sandvik steel-band cooling conveyors for the chilling of coal-tar pitch. Each unit is capable of cooling 84 tons of pitch per day of the quality required by the coal briquetting industry.

The principle of operation of the conveyor, manufactured by Sandvik Steel Band Conveyors, Limited, Birmingham, is that a thin layer of molten pitch is conveyed through cooling water, to produce a solidified product.

Principle of Operation

The 32-in. wide band, of 0.65 per cent., cold-rolled, hardened and tempered "Charcoal" steel, is 0.047 in. thick, and is driven by a cast-iron driving drum of 48 in. dia. The return drum is also 48 in. dia. and is mounted in a movable tension frame. Tension is applied to the steel band, to promote the necessary friction by means of compression springs, the tensioning force being transmitted to the return frame by two flexible ropes, one on each side of the conveyor.

Flanged depression pulleys (Fig. 2) situated at the hot-pitch end of the conveyor, deflect the steel band into the water trough to enable the pitch to be submerged to a depth of about 2 in. Further deflection pulleys near the end of the conveyor allow the cooled pitch to leave the cooling water, when three rubber squeegees remove the surplus water.

Cooling water is circulated in a galvanized steel trough in which the upper strand of the steel conveyor runs. The hot fluid pitch is fed to the water-cooled bands (Fig. 3) from a thermostatically controlled feed tank which ensures that the pitch is between 140 and 160 deg. C., to maintain the correct viscosity. The flow of pitch is controlled to prevent eddies and surges by a weir feeder mounted over the conveyor.

A layer of pitch, between $\frac{3}{16}$ and $\frac{1}{4}$ in. thick is fed directly on to the steel band. Water sprays direct jets of water on the underside of the conveyor to prevent the molten pitch flowing over the edges of the steel band. The band then conveys the pitch in to the cooling water, and during 93 ft. of submerged travel, the pitch is cooled to within 5 deg. C. of the water. Fumes, emitted during the delivery of hot pitch on to the chilled band,

FIG. 1.—SUNKEN PITCH BEDS AT THE BECKTON TAR AND AMMONIA PRODUCTS WORKS.

are collected in a fume hood and are extracted by an exhaust fan.

The cooled pitch is readily removed from the conveyor by a scraper at the discharge end where it breaks into irregular pieces (Fig. 4). At the Beckton Products Works a short intermediate conveyor collects the pitch from the two cooling conveyors and delivers it on to an elevating belt for loading into railway trucks or lorries.

Each conveyor is driven by a 10-h.p., 1,440-r.p.m. motor, through a single worm reduction gear and p.i.v. gear to give a variable band speed from 20 to 80 ft./min. The supporting structure of the conveyor is fabricated from mild-steel sections, and the return belt is supported by idler sets of four 6-in. dia. rollers.

It is hoped that this application of steel-band conveyors will allow the existing cooling beds at the Beckton works to be relinquished, making it possible to use the area for further development.

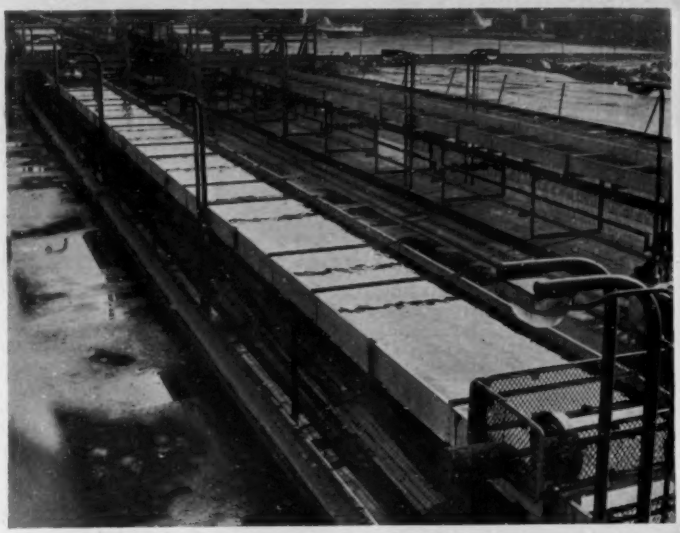
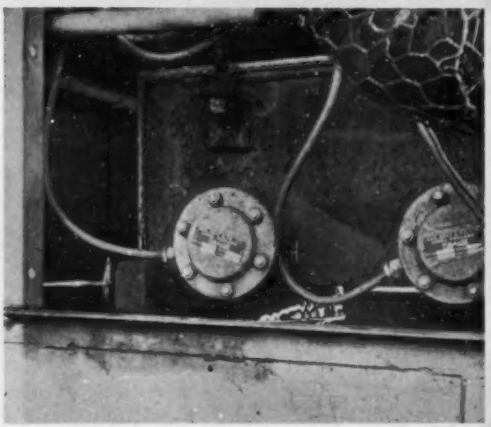


FIG. 2.—SANDVIK STEEL-BAND COOLING CONVEYOR, SHOWING THE DEPRESSION PULLEYS, IN THE LOWER RIGHT-HAND CORNER.

FIG. 3.—FLUID PITCH FEED TANK TO STEEL BANDS.

FIG. 4.—DISCHARGE END OF THE STEEL-BAND COOLING CONVEYOR.



Miscellaneous Mines in Great Britain

The Ministry of Power has prepared a list of miscellaneous mines (*i.e.*, mines other than coal, stratified ironstone, shale, or fireclay) in Great Britain, giving the names and addresses of owners, the names and addresses of mines, and the minerals worked. A copy of the list, giving particulars of nearly 200 mines, may be obtained on application to the Ministry of Power, Safety and Health Division, Thames House South, Millbank, London, S.W.1. The price is 5s., including postage. The list is to be revised annually.

SELF-FLUXING SINTER

Aid to More Efficient Blast-furnace Operation

In theory the use of sinter fluxed with crushed limestone should give improved thermal economy in blast-furnace operation, and experience on two plants of Colvilles, Limited, as related by E. H. Baldwin, I. M. Mathieson, and D. MacNeill, who are associated with that concern, in a paper presented to the West of Scotland Iron and Steel Institute, and summarized below, has shown that this can be realized in practice without detriment either to sinter plant or blast-furnace operation.

THE experiments which led Colvilles, Limited, to the adoption of fluxed sinter were prefaced by an examination of the possible sources of benefit to the blast-furnace process. The following factors were judged to be most relevant:

(*a*) The heat required for the endothermic decomposition of the limestone (769 BThU/lb.) need not be generated within the furnace. Incidentally, considering blast furnace and sinter plant as a single unit the total amount of carbon actually consumed is considerably reduced because of the better combustion conditions prevailing on the sinter strand.

(*b*) Raw limestone passing down the furnace stack is calcined in the range 850-1,000 deg. C., where some of the CO_2 released will unavoidably be reduced by solid carbon. The less CO_2 evolved the less will be the carbon solution loss. For every pound of CO_2 reduced to CO the heat required is 1,595 BThU. If this reaction does not proceed rapidly enough to reduce the bulk of the limestone CO_2 the latter will lower the reducing potential of the ascending gases, thereby diminishing the amount of the indirect reduction actually carried out. In either event there is a loss of thermal efficiency attributable to the charging of raw limestone.

(*c*) The solution of lime in the primary slag is slightly exothermic in character and if the lime is added to the sinter there will be a certain thermal loss to the furnace. However, the quantity of heat involved is virtually negligible being of the order of 20 BThU/lb. of limestone.

(*d*) If the sinter is fluxed, the quaternary mixture containing CaO should melt at a lower temperature than the unfluxed ternary ($FeO—Al_2O_3—SiO_2$), thus raising the zone of slag formation to a higher level in the furnace.

(*e*) Without limestone addition the sintering of a siliceous ore gives rise to the formation of fayalite ($2FeO.SiO_2$). The iron oxide locked in this compound is not available for reduction by the stack gases and its history in the furnace is probably as follows:

$2FeO + SiO_2 \rightarrow 2FeO.SiO_2$ (in sintering)

$2FeO.SiO_2(solid) \rightarrow 2FeO.SiO_2$ (liq.) (at top of bosh)

$2FeO.SiO_2(liq.) + 2CaO + 2C \rightarrow 2CaO.SiO_2(liq.) + 2Fe.(liq.) + 2CO$ (bosh slag reactions).

The addition of limestone in sufficient quantity to the sinter mix locks up all the silica in calcium silicate during the sintering operation and iron oxide is left available for indirect reduction. It is not likely that the prevention of fayalite formation will be of importance in rich ore practice since there the proportion of direct reduction will be high in any event.

(*f*) It has been suggested that fluxed sinter contains calcium ferrite, which is desirable as it acts as a bonding agent of fair reducibility. However, it has been shown that ferrite is not formed unless the lime:silica ratio is greater than 2.0:1. MgO from dolomite additions appears to be quite inert during the sintering process and contributes nothing to the bond as it forms neither ferrites nor silicates.

(*g*) It had been anticipated that adding flux to the sinter would result in decreased strength, and in the absence of adequate sinter screening facilities furnace performance might be affected by an undue proportion of sinter fines. It was felt that this possible drawback would be outweighed by other considerations and would have to be faced when it arose.

Items (*a*) and (*b*) (which alone are thermally assessable) are calculated in Table 1. Assuming a top gas ratio of 1.8:1, the use of fluxed sinter would in the above example provide a thermal saving equivalent to 1.23 cwt. of carbon or 1.45 cwt. of coke per ton of pig.

TABLE 1.—*Heat Requirements for Decomposition of Limestone, and Carbon Solution Loss using Unfluxed, compared with Fluxed Sinter.*

	Unfluxed sinter.	Fluxed sinter.
Amount of limestone charged	770 lb. (for all purposes)	135 lb. (to flux coke ash only)
Decomposition of raw limestone in furnace	591,000 BThU per ton pig-iron	104,000 BThU per ton pig-iron
Carbon solution loss ..	256,000 BThU per ton pig-iron	45,000 BThU per ton pig-iron
Total	847,000 BThU per ton pig-iron	149,000 BThU per ton pig-iron

Iron-making Practice

Consideration of the foregoing points indicated that the thermal efficiency of furnace operation would be improved by the use of fluxed sinter and that the extent of the improvement would depend upon (1) the proportion of sinter normally carried in the burden, (2) the overall lime requirement of the burden, and (3) the amount of flux which could

be added to the sinter without severe detriment to sinter quality. A brief summary of the iron-making resources of the company indicates the relevance of these points to its blast-furnace operation.

Iron is made at two plants, Clyde Iron Works, which as now constructed has been in operation for 20 years, and Ravenscraig Steel Works, which was commissioned in August, 1957. At Clyde there are three furnaces of hearth dimensions 18 ft. 3 in., 18 ft. 3 in. and 20 ft., respectively, with a total output of 13,000 tons weekly. One single-strand Dwight-Lloyd sinter machine is in operation with a maximum output of 7,000 tons weekly.

The Ravenscraig plant at present contains one 25-ft. 9-in. dia. blast furnace and a Dwight-Lloyd sinter plant with a grate area of 720 sq. ft. and 20 wind boxes, which it is expected will give a maximum output of 12,000 tons weekly. The outputs listed refer to normal operation on foreign ores. The major foreign ores imported to Scotland are Swedish (Gellivare and Grangesberg), Wabana, Labrador, Venezuelan (Cerro Bolivar) and African (Oued Zem, Ouenza and Conakry).

The ores are screened without further crushing, the roughs being charged direct and the fines sintered. Since the highest percentages of SiO_2 lie in the ores with least fines (Wabana and Oued Zem) it is difficult to transfer a high proportion of limestone from the furnace to the sinter plant unless the basicity ratio of the fluxed sinter is maximized. Without deliberate crushing of these siliceous ores the fluxed sinter must have a basicity ratio of the order of 2.0-2.5:1 before all the raw limestone can be taken off the furnace. The achievement of maximum economy depends therefore on whether fluxed sinter of this high basicity can be successfully made and used.

The first trial with fluxed sinter took place at Clyde in March and April 1957. Several difficulties inherent in the design of the plant had to be faced. Firstly, the screening and sinter plants were scarcely adequate to cope with the large proportion of ore fines being imported at that time; the sinter screening capacity was limited. In order that the harmful effects of bad sinter might be confined to one furnace only, burdens were adjusted beforehand so that over 60 per cent. of the sinter was consumed by No. 1 furnace, the remainder being divided between No. 2 and No. 3. After several weeks' operation on this basis crushed limestone was introduced to the sinter mix.

From the outset there was trouble in keeping the sinter basicity constant. By far the greatest snag, however, was the incomplete screening of the sinter. A factor tending to increase the fines in the sinter was the method of cooling, by sprays playing into the high-level sinter bins. During the three weeks that fluxed sinter was used the operation of No. 1 furnace was noticeably less regular than normal. The proportion of fines in the sinter varied from normal to very high and as a result the flue dust losses were exceedingly erratic. For this and other reasons the trial was discontinued until arrangements could be made to provide more efficient screening of raw sinter.

Fluxed Sinter Practice at Ravenscraig

The new furnace at Ravenscraig was blown in during August, 1957, and an early opportunity was taken to continue experiments with fluxed sinter. For the first six months of its campaign the furnace operated with about 15 per cent. of unfluxed sinter in the burden $(CaO+MgO)/SiO_2=0.46$. When conditions had become settled about 7,000 tons of iron were being produced weekly at a coke rate of 15.30 cwt. per ton. During this period all the flux entered the furnace as raw limestone, which constituted about 15 per cent. of the burden excluding coke.

When the difficulties of bringing a new plant into production had been overcome the output of the sinter plant rose to 25 per cent. of the furnace burden and flux additions to the sinter were commenced. During subsequent operation with fluxed sinter of basicity 1.5 the mean coke rate fell by 0.72 cwt. per ton of iron. The raw limestone charged was reduced from 6.79 to 4.62 cwt. per ton of iron and the furnace output rose by 400 tons weekly, the blowing rate being unchanged.

These results were encouraging and the fluxed sinter was then increased to constitute about 50 per cent. of the furnace burden. A further reduction of 1.46 cwt. per ton in coke rate was obtained, the raw limestone being reduced from 4.62 to 2.76 cwt. per ton of iron. Unfortunately this period coincided with a reduction in blowing rate due to trade conditions and obviously not all of the reduction in coke rate could be attributed to the increased use

TABLE 2.—*Results Using Self-fluxing Sinter in Ravenscraig No. 1 Blast Furnace.*

Operating and performance factors.	Average operating data.		
	Period I (18 weeks).	Period II (22 weeks).	Period III (14 weeks).
Burden characteristics			
Total net burden, cwt./ton iron	41.80	39.26	36.83
Sinter, per cent. of total burden	14.53	24.08	46.85
Sinter, cwt. /ton iron	6.14	9.98	18.14
Sinter basicity	0.46	1.50	1.54
Limestone, per cent. of total burden	15.81	11.14	7.12
Limestone, cwt./ton iron	6.79	4.62	2.76
Total fluxes (incl. acid slag), per cent. of total burden	15.81	12.81	9.23
Total fluxes (incl. acid slag), cwt./ton iron	6.79	5.31	3.57
Slag volume, cwt./ton iron	9.32	8.87	8.42
Scrap, cwt./ton iron	0.80	0.74	0.28
Blast characteristics			
Blast volume, 1,000 cub. ft./min.	62.9	62.0	46.5
Blast temperature, deg. C.	704	687	758
Blast pressure, lb./sq. in.	19.5	21.1	22.7
High top pressure, lb./sq. in.	—	—	4
Performance data			
Weekly output of iron, tons	7,270	7,715	7,180
Coke rate, cwt./ton iron	15.27	14.55	13.09
Carbon rate, cwt./ton iron	13.07	12.45	11.26
Flue dust losses, cwt./ton iron	1.16	2.21	1.89
CO/CO_2 ratio in top gas	1.82	1.82	1.52
Slag basicity $(CaO+MgO)/SiO_2$	1.28	1.32	1.31
Al_2O_3 in slag, per cent.	20.25	19.78	19.70
Si in iron, per cent.	0.85	0.94	0.89
S in iron, per cent.	0.042	0.046	0.049
P in iron, per cent.	0.72	0.64	0.53
Mn in iron, per cent.	0.94	0.90	0.87

of fluxed sinter. The relevant data for these three periods are given in Table 2.

A straightforward comparison of the data for the three periods does not constitute a fair assessment of the effects of fluxed sinter. However, simultaneously with the introduction of fluxed sinter the proportion of sinter in the burden was increased; moreover, there were other alterations in the composition of the burden. Also, as the blowing rate was drastically reduced during the third period, it was decided to focus attention on the first two periods. Even so, because of the number of variables it was felt that statistical analysis was necessary. The extent of the correlation between carbon rate and other factors was investigated.

Statistical treatment showed that the percentage of sinter in the burden did not correlate significantly with the coke rate. This may have been due to the fact that in the second period there was an excess of ore fines and although the sinter in the burden increased, the percentage of fines in the remainder of the burden also increased. If it is assumed in rich ore practice that the chief merit of sinter lies in the removal of ore fines then the two facts mentioned may well cancel each other.

There was found to be a significant relationship between carbon rate, slag volume and raw limestone, the regression equation being: $y = 9.88 + 0.257X_L + 0.16X_V$ where y = carbon rate in cwt./ton iron X_L = raw limestone charged to furnace (cwt./ton iron) X_V = slag volume (cwt./ton iron).

This equation explained 60 per cent. of the variation in the carbon rate and for the first few months operation of a new plant this is probably a very fair proportion. The equation emphasizes that the importance of fluxed sinter lies in the removal of raw limestone from the furnace burden. The relationship with slag volume is characteristic of rich ore practice where the volatile content of the burden is small and constant.

No correlation could be found between carbon rate and CO/CO_2 ratio as determined by top-gas analysis. Further examination showed that the CO/CO_2 ratio was virtually constant at any given blowing rate irrespective of the amount of raw limestone used. It thus appears that for a reasonably efficient practice there is a limiting top-gas ratio, the value of which is controlled by the blowing rate. The lower the blowing rate the lower becomes this limiting value. Since the top-gas ratio is unaffected by a reduction in the quantity of raw limestone charged, more efficient utilization of the stack gases is obtained when the proportion of raw limestone, and hence CO_2 is diminished.

In order to test the validity of the equation derived from the first two periods the mean carbon rates for the second and third periods were corrected to the conditions of the first period (Table 2). Corrections for slag volume and raw limestone charged were made using the equation already derived, and blast temperature was allowed for by using Ridgion's coefficient of 0.04 cwt. per ton per 10 deg. C. The close agreement of the third period with the other two in respect of carbon rate appears to confirm the values chosen for the influence of the major variables.

In particular, the raw limestone correction, which is by far the greatest, seems to be accurate, and thus the beneficial effect of fluxed sinter is not only verified but evaluated. The results obtained indicate that for every cwt. of raw limestone per ton of iron transferred to the sinter the carbon rate is reduced by 0.26 cwt.

TABLE 3.—*Mean Carbon Rate, with Corrections for Slag Volume, Raw Limestone Charged, etc.*

	Period I.	Period II.	Period III.
Mean carbon rate	13.07	12.45	11.26
Correction for slag volume ..	—	+0.07	+0.14
,, ,, raw limestone ..	—	+0.56	+1.05
,, ,, blast temperature	—	−0.07	+0.28
,, ,, blowing rate ..	—	+0.01	+0.27
Corrected carbon rate ..	13.07	13.02	13.00

All figures cwt./ton.

Following the successful application of fluxed sinter at Ravenscraig a second attempt was made at Clyde. No. 3 furnace had been blown out for relining and as No. 1 was expected to be taken off in the near future No. 2 was chosen for the trial. By re-designing the discharge chutes, sinter screening was made continuous and cooling by water spray was discontinued. Probably because of these alterations the difficulties experienced in the first trial did not arise again; flue dust losses did not increase and there was no deterioration either in iron quality or furnace movement. Omitting the two weeks of transition, the results of the first four weeks of steady operation compared with those of the previous 11 weeks on normal sinter, the results showed an overall reduction in carbon rate of 0.69 cwt./ton.

Considering that the major corrections were derived from another furnace the difference of 0.02 cwt./ton between the theoretical and actual carbon rates was not unsatisfactory especially in view of the shortness of the second period. It was therefore assumed that the advantages of fluxed sinter were of the same magnitude as those experienced at Ravenscraig, although more extended operation was necessary to confirm this. However, the period reported, short as it was, confirmed that sinter basicity of 1.8 to 1.9, even though manufactured in a somewhat elderly sinter plant, could be used without detriment to furnace operation.

General Conclusions

In theory, the use of sinter fluxed with crushed limestone should give improved thermal economy, and experience on two plants has shown that this can be realized in practice without detriment either to sinter plant or blast-furnace operation. For every cwt. of raw limestone transferred from the furnace burden to the sinter a reduction in carbon rate of the order of 0.26 cwt./ton pig is obtained. Although sinter strength deteriorated somewhat with basicities in excess of 1.5 sinter up to 3.0 has been used quite successfully provided that it was slowly cooled and adequately screened before entering the furnace bin.

BOOK REVIEWS

Asbestos. By W. E. Sinclair. London: Mining Publications, Limited, Salisbury House, London Wall, E.C.2. 60s.

THIS new edition of Sinclair's work, a book generally welcomed when it first appeared in 1955, has been made even more comprehensive. Several new chapters dealing with primary production and the manufacture of asbestos products in North America, a field recently visited by the author, have been added. Besides a geological appraisal of the future potential in that area, details are given of actual mining and milling at the various producing centres, and the latest fabrication techniques are fully described. This aspect of the asbestos picture has been brought up to date in respect of all the main world producing and manufacturing fields. The relevant statistics covering production, distribution, marketing, and prices are included, and there are a number of charts giving details which date from the earliest and cover the latest records.

The basic chapters dealing with the origin of the asbestos minerals and the record of recovery, from source to final uses, have been revised, with the description of many new discoveries and particulars of recent developments in various branches of the industry.

Principal aim of the book is to give a detailed and authoritative picture of the several varieties of asbestos and their spheres of usefulness. It is thus interesting not only to practising engineers and executives but to students and others connected directly or indirectly with the industry.

Toilers of the Hills. By Sir Edgar R. Jones, KBE. Pontypool, Mon: Hughes & Sons, Limited, Griffin Press.

FEW have done more than the author to stimulate markets both in this country and abroad for Welsh tinplate. He first became familiar with the business when, for the greater part of the first world war, he supervised its affairs while Controller of the Priority Department.

At the end of hostilities he undertook, at the request of the Association of Welsh Plate and Sheet Manufacturers, propaganda in countries where import tariffs were being raised, urging them not to increase duties on Welsh tinplate. The effort was attended with success, and by 1924 Welsh tinplates were being shipped to every country in the world except the United States, where continuous strip rolling was being adopted as the result of experiments conducted during the war. At that time the Americans and Germans began an attack with special quality tinplates coinciding with complaints of "defective" Welsh plate. Indeed, the largest foreign customer, the Asiatic Oil Company, on whose requirements the industry had concentrated, was under pressure to direct orders from the Welsh works to the better quality tinplates from the United States.

Exports began to slump and home consumption seriously contracted. The author's efforts were then directed to stimulating interest in canned foods, the imports of which from America at the time were costing some £22,000,000 annually. He was instrumental in forming the National Food Canning Council and was himself appointed chairman.

To complete the general set-up, the Metal Box Company was created to provide plant to manufacture the various types of special cans required. That preamble very briefly covers the following chapters: IV, The American Business; V, The Canning Business; VI, National Food Canning Council; VII, Struggle for Orders, and VIII, International Arrangements. Chapter IX deals with disturbance caused by the last war and the efforts to meet the growing demand for sheets and tinplates. The first three chapters are: "Early Toilers of the Hills," "Tinplate" and "From Iron to Steel," in which the earliest conditions and methods of tinplate manufacture are interestingly described.

For those of the immediate past generation who have spent most of their working lives associated with the old hand-fed tinplate mills in South Wales during the past 50 years, these chapters cannot but evoke sad recollections. The initial change from the old conventional mills to the continuous strip mill for sheet and tinplate production referred to in Chapter X was no sudden development. Indeed, it is about a quarter of a century since the late Sir William J. Firth, then chairman of the Richard Thomas group, made the startling announcement of his intention to instal a continuous strip mill at Ebbw Vale.

It is now history that the project was launched in face of doubt and opposition, and that unforeseen financial difficulties were sufficient to prevent him bringing the scheme to fruition. This, however, was not long delayed, for the plant was installed and actually producing weekly in 1939 at its rated capacity of 60,000 basic boxes of tinplate, and later the output had risen to some 90,000 boxes. The rightness of the original idea, therefore, was vindicated. Now with the great extension of the continuous process, the old hand-fed rolling mills have virtually disappeared.

In a final comment on the changed situation, the author recalls that to the number of ruins in South Wales will now be added more than 80 derelict works that will take a long time to crumble. Improvements to the "dismal approach from station to town in Llanelly" will involve the removal of boundary walls of abandoned works, "but elsewhere most of the ruins will stand in the valleys, because they are unsuitable for adaptation and too costly to clear away—ghastly reminders in the moonlight of the toilers of the hills."

Pocket Calendar for Lignite Coal, Metal, and Salt Mines, and Oil Technology 1960. By Tilmann, Schlaudraff and Hoffmann, Düsseldorf, Western Germany. Published by K. Marklein. 430 pp. (German text).

THE 1960 issue is a continuation of previous editions containing material related to the various branches of mining engineering as practised in Germany. Reference is made to the eleventh edition of the "Pocket Calendar for Mine Officials of the Collieries" regarding general mining practice. Various items presented in past issues listed in the general index are not repeated in full, and it is, therefore, important to collect all previous volumes.

The chapter on lignite coal mining contains descriptions of equipment for open-cast mining, *viz.*: tippers, caterpillars, bulldozers, payloaders, graders, and power shovels, and it also gives information about repair work on belt conveyors. Mucking and scraping in metal mines is dealt with in length. Various types of salt deposit are reviewed with a view to discussing suitable mining methods. The main topics described under the heading of oil technology are the history and development of the various types of drilling turbine; dual completion is also discussed. A classified buying register is included in the calendar.

Considering the wealth of material already available in various current publications, the calendar does not appear to contribute a great deal of fresh information.

Automatic Heat Treatment of Bearing Rollers

FITTING of roller bearings to goods rolling stock as part of the British Railways modernization plans has led to the installation of new heat-treatment plant at the East Works, Daventry, of British Timken, Limited. The plant is arranged as a continuous production line (Fig. 1) in which Efco furnaces automatically harden and temper the rollers after deep gas carburizing.

The line includes a shaker hearth furnace with quench tank and electrically operated charge elevator, an endothermic atmosphere generator and a mesh belt conveyor furnace, all manufactured by the Electric Resistance Furnace Company, Limited. Between the quench tank and the mesh belt furnace there is an Efco washing machine designed and manufactured by the Electro-Chemical Engineering Company, Limited.

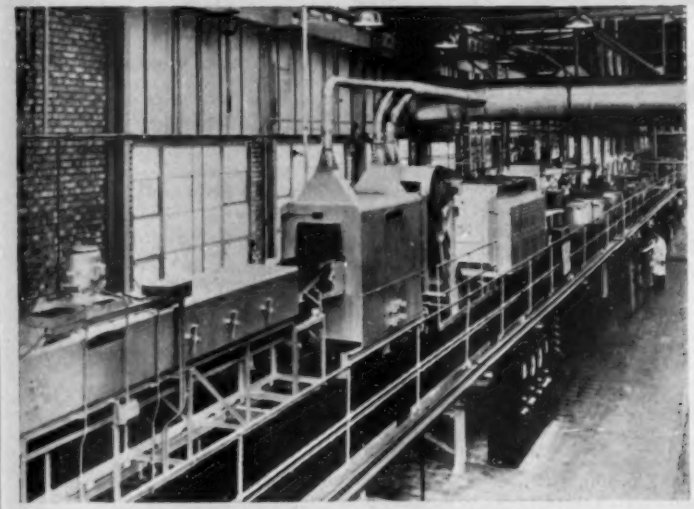


FIG. 1.—CONTINUOUS PRODUCTION LINE FOR HARDENING AND TEMPERING ROLLERS AT THE EAST WORKS, DAVENTRY, OF BRITISH TIMKEN, LIMITED.

With the exception of the quench tank and control gear, the production line is installed on an overhead platform, conserving floor space and allowing the quench tank to be accommodated beneath the hardening furnace without excavations.

The rollers to be heat treated are carried by an electric elevator into a hopper which feeds them on to the oscillating hearth of the hardening furnace. This hearth is 18 in. wide and is made of nickel-chromium. It is actuated in one direction by an electric motor driving an operating cam, and in the other direction by a spring return mechanism. The operating frequency can be adjusted to vary the speed of travel of the parts through the furnace and to allow heating times up to 1 hr.

Rollers enter the furnace chamber through a short heat-insulated vestibule fitted with a fume removal hood and having a vertically rising door to allow adjustments to be made to the height of the furnace entrance. The chamber is 8 ft. long and is heated by electric radiant tubes. The elements are positioned above and below the hearth and can be withdrawn quickly and easily from one side of the furnace without having to close down the furnace. They are arranged in three independently controlled zones, each having its own automatic indicating controller. The temperatures are recorded on a three-point instrument.

The heated rollers leave the furnace by a discharge chute and, to ensure quenching from the full hardening temperature, they immediately enter an oil weir on the chute itself. The oil pumped to the weir travels with the rollers into the quench tank which is an independent and self-supporting unit fitted with over-flow and oil circulating connections.

Tempering

An electrically operated elevator having an endless, perforated, steel conveyor belt fitted with cross flights carries the quenched rollers to the washing machine. Here, in a single stage, gas heated machine, the quenching oil is removed with a hot detergent spray. The machine is fitted with a wire mesh conveyor belt from which the cleaned rollers pass down a chute to be distributed evenly by guide rails on to the conveyor of the tempering furnace.

In the tempering furnace the rollers are heated by forced circulation of an air flow which is directed with baffles from a fan in the roof, over heater banks and through the chamber.

The shaker hearth furnace provides temperatures up to 950 deg. C., and has a total rating of 63 kW. It is supplied with a controlled atmosphere, produced in an Efco generator by the endothermic process, to keep the rollers free from decarburization. The tempering furnace normally operates at 160 deg. C., but can supply temperatures up to 300 deg. C. It is rated at 50 kW.

The complete installation was designed to provide a minimum output of 100 lb. of ¾-in. dia. rollers an hour, including a soak period of 1 hr. Without this soak period the output of rollers is 200 lb./hr., and for a different type of product, could be as high as 300 lb./hr., depending on size to weight ratio, etc.

General Electric Company's Activities in 1959

IN a review of 1959, the General Electric Company, Limited, states that there was intense activity in the production of winding engines, some 16 electric winders being commissioned during the year, four of them oversea and 12 in Britain for the National Coal Board. Among those put into service oversea was a four-rope friction winder at the Stilfontein Mine of the General Mining & Finance Corporation of South Africa, which hoists a load of 15 tons from a depth of 4,800 ft. This is believed to be the greatest depth to which any friction winder is operating. Included in the numerous orders received from the NCB were two which used grid-controlled mercury-arc rectifier-inverters to provide the speed control system.

During the year, one of the largest single-unit coal-preparation plants in this country was commissioned at the Hawthorn Combined Mine of the NCB. It deals with an input of 750 ton/hr. with the larger fraction cleaned by the well-known Chance sand flotation system and the fines by froth flotation.

The work on electrical converting plant included standard air-cooled, pumpless steel-tank rectifiers, as well as grid-controlled versions. In the semiconductor rectifier field, GEC is now manufacturing silicon semi-conductor power rectifiers. Orders for silicon rectifiers in hand include one with an output of 2,000 kW for installation at the Mond Laboratory, Cambridge.

In connection with industrial electrification in the steel industry, important modernization schemes were completed at the Shotton Steelworks of John Summers, Limited, and the Ebbw Vale Steelworks of Richard Thomas & Baldwins, Limited. A feature of the Shotton scheme is the installation of automatic screw-down control equipment actuated by a positional servo-mechanism. At Ebbw Vale, in addition to the re-motoring of the hot-strip mill, the four-stand cold mill has been re-powered. Plant and control gear for a 16-in. resistance-weld tube mill for Stewarts and Lloyds, Limited, is under construction. This mill is to be erected at Shotton, and will be the largest tube mill in the country.

School for Welders

MORE than 800 welding students, many of them from oversea, pass through the welding school of British Oxygen Gases, Limited, at Cricklewood, London, each year. Forming part of the company's sales technical service department, it is the largest of several welding schools operated by British Oxygen Gases. It can train 48 students in oxy-acetylene processes and 12 in argonarc welding at any one time.

Courses range from two weeks' oxy-acetylene welding instruction on light gauge sheet and tube, to a general and maintenance syllabus lasting up to eight weeks. Specialist courses embracing pipe, lead, bronze, and Argonarc welding, flame hardening, oxygen cutting, flame cleaning, lancing, thermic drilling and powder cutting are offered separately or as adjuncts to the basic courses.

Improved Counterblow Hammer Introduced

IN recent years there has been a considerable increase in the interest shown by drop forgers in the counterblow type of hammer, and in view of this, the design has been completely revised to meet the very severe working conditions imposed by modern drop forging practices. A new and unique feature of the design, which has been developed by B. & S. Massey, Limited, Openshaw, Manchester, is the belt-coupling compensating gear for which a patent is pending.

The gear ensures synchronized movement of the upper and lower tups by means of a mechanical coupling. Two couplings are provided, one at each side of the hammer, the reverse motion being transmitted by steel belts with special lightweight connections made in steel. A shock absorber is provided for each tup connection, which consists of a flanged sleeve and a pack of alternate steel and rubber washers.

Alloy steel adjusting bolts, which are pinned to the connections of the belts, are provided with spherical seatings to minimize the off-centre loading on the connection due to the changing angle of inclination of the coupling with the tups.

To ensure equal loading of the two pulley assemblies, they are provided with compensating cells, connected hydraulically. Each cell has a glandless expansion joint, the sealing unit being a well-tried proprietary bellows of laminated stainless steel.

A considerable differential movement can be permitted in the couplings before adjustment is necessary, and an indicator is provided in a convenient position which shows at a glance the state of adjustment. This special compensating feature in the coupling ensures equal belt tensions at all times, and avoids offset loading on the tups which may cause tilting in the slideways and premature failure of the belt.

Pig-iron from Steel Scrap

ALTHOUGH electric-arc furnaces, used for the production of steel from scrap metal are common, the production of pig-iron from reclaimed steel scrap is contrary to normal practice. This procedure, however, is being adopted by the foundry department of Ferranti, Limited, Hollinwood, Manchester.

This ambitious scheme will result in considerable economies as pig-iron was formerly purchased from an outside source. It has been made possible by the installation of a Birlefco 3-ton capacity electric-arc furnace.

The scrap consists mainly of croppings from transformer laminations and other mild steel. To this material, back scrap from the foundry, plus a recarburizing compound will be added to raise the carbon from about 2 per cent., to between 3 and 3½ per cent. Additions of silicon and manganese will be made to produce suitable grades of cast iron. Other materials to be produced in the new furnace will include "Nogmag," a non-magnetic grey cast iron, developed by the foundry department in 1923.

CHEMICAL CONSTRUCTION (GB), LIMITED, London, and Whessoe, Limited, Darlington, are to collaborate in the design and construction of Chemico catalytic carbon monoxide removal plants for the detoxification of town gas.

New Equipment and Products

Hacksaw Blade with Progressive Teeth

ONE of the most common causes of trouble with hand hacksaw blades is failure to select the correct pitch of teeth for a particular job. This often causes breakages of teeth or of the actual blade itself, particularly if high speed hand blades are being used. Now, a new type of hacksaw blade with progressive teeth which overcomes the necessity for changing blades for different jobs is being manufactured by Hacksaws, Limited, of Sheffield. Called the "Aven" Progressive Teeth, it has a pitch of 29 teeth per inch at the start, increasing in size gradually to 18 teeth per inch at the back end of the blade.

Using the full length of the blade, advantage is taken of the natural action of hacksawing in which less weight is applied at the start of the cut than at the end of the stroke. "Aven" progressive teeth blades with their gradually coarsening pitch cause the amount of material removed to be increased as the stroke progresses and increased weight is applied. As the right pitch is always being used, the blade is never jarred and this avoids breakages.

Blades are supplied in either high speed or low tungsten steel and are particularly suitable for use by unskilled operators.

Stable-hole Conveyor

NOW available from Richard Sutcliffe Limited, Horbury, Wakefield, is a stable-hole conveyor, Fig. 1, designed for the maintenance of stable holes in advance of the coal face, and for the reduction of the manpower required at this point. Easily transported, it can be

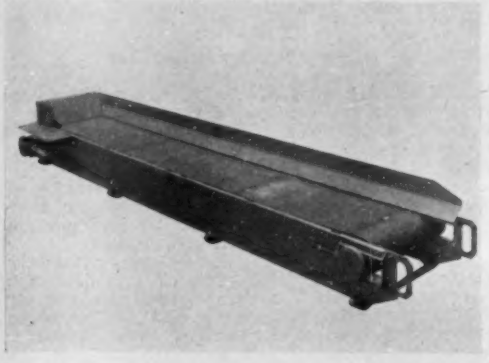


FIG. 1.—STABLE-HOLE CONVEYOR WITH NEAR-SIDE SPILL-PLATE REMOVED.

used wherever coal or stone has to be moved short distances in confined spaces.

Designed to use an 18 in. wide belt, the conveyor is driven at the tail end by a combined electric motor and drive pulley assembly, and at the delivery end by a tensioned return pulley. The frame is fabricated from mild steel sheets which form a trough for the top belt and at the same time provide complete protection for the bottom belt.

A hopper is fitted at the loading end to receive the material and removable spill plates are fitted for the full length of the machine at one or both sides as required. The whole unit is transported by sliding on the tubular steel skids.

The motorized driving drum is rated at 2 h.p. and incorporates the electric motor and reduction gearing. The motor leads are brought out to a junction box fitted with a standard 30-amp restrained type FLP plug and socket, so that the conveyor can be run from a standard drill panel. The belt supplied is p.v.c. three-ply, 32 oz. Tugron duck with $\frac{1}{16}$ in. top and back covers. Normal drum centres are 10 ft. but other lengths may be arranged to suit varying applications.

The conveyor has a capacity of 50 ton/hr., and a belt speed of 175 ft./min. It has an overall length of 11 ft. 6 in. and is 18 in. high.

Bag Packing Machine

A NEW design of valve bag packing machine, manufactured under licence from H. L. Stoker Company, US, is announced by Richardson Scale Company, Limited, Nottingham.

Features in this new machine, shown in Fig. 2,

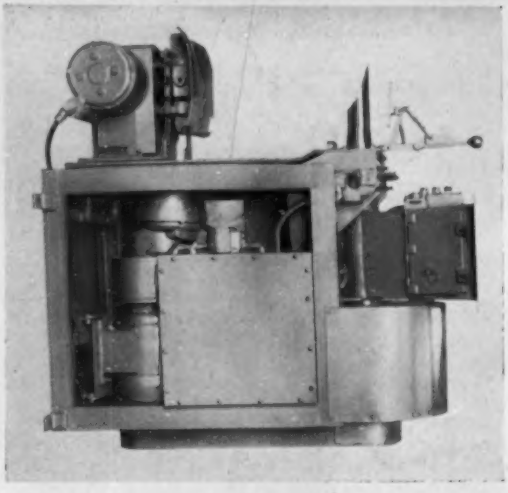


FIG. 2.—NEW DESIGN OF BAG PACKING MACHINE.

include a power operated agitator in the feed hopper, two-speed automatic control for main and slow feed, filler screw reversal, and a bag-settling device.

The Stoker machine is a combined weigher and packer, approved by the Board of Trade Standards Department for weights and measures.

High-strength Concrete Aggregate

THE Lafarge Aluminous Cement Company, Limited, is marketing a new synthetic aggregate for use with Ciment Fondu high alumina cement, the resultant heat resistant concrete attaining high qualities of density, hardness and strength in 24 hr. The new product, called "Alag," in some respects resembles a crushed basalt aggregate, with a chemical affinity for high-alumina cements.

Alag is dense, non-absorbent and extremely hard. Concretes made with it and Ciment Fondu consequently have great strength and are able to withsand temperatures up to 1,200 deg. C. The aggregate,

it is claimed, is abrasive-resistant at all temperatures, and cold strength is stated to be almost twice that of normal Ciment Fondu concrete. After 24 hr., the compressive strength is 13,000 lb./sq. in., compared with 7,500 lb./sq. in. for normal Ciment Fondu concrete. After seven days, Ciment Fondu/Alag concrete has a compressive strength of 16,000 lb./sq. in. This superior strength is approximately maintained through a heat range of from 600 to 1,200 deg. C., figures for the higher temperature being 3,800 lb./sq. in., compared with 2,800 lb./sq. in. for ordinary refractory concrete.

The density of the concrete is approximately 170 lb./cub. ft. air-dried, 20 lb./cub. ft. greater than ordinary structural aggregates.

Heavy-duty Grease Pump

SPECIALLY suitable for feeding heavy lubricants, if necessary, at high pressures, the Hercules high-pressure pump (Fig. 3), manufactured by Centralube, Limited, Edmonton, London, N.18, is capable of pumping bitumastic materials, *e.g.*, Shell Cardium C or D compound, or Mobil Dorcia 150, and can operate at a maximum working pressure of 15,000 lb./sq. in.

The pump is foot operated, a handwheel being screwed down approximately every 20 to 40 pump

FIG. 3.—HERCULES HIGH-PRESSURE PUMP.

strokes, to ensure that the lubricant finds its way into the pressure chamber.

The output per stroke may vary slightly with the type of grease; in the case of a grease of penetration 250, it is 2.3 gm. per stroke.

The pump is suitable for lubrication of chassis and machine parts and through long pipelines, and can also be used with positive dividers, and as such is an intermediate step between a centralized lubrication system and grease nipples. By inclusion of relief or other suitable valves, the pump can be adapted to operate with single line and dual line centralized lubrication systems.

Weighing just under 50 lb., the Hercules pump is equipped with two wheels for easy movement from one application area to another.

Self-propelled Drill

INTRODUCTION of the Model 155 down-the-hole, self-propelled drill (Fig. 4) for operations where holes in the 4½-in. to 5-in. dia. range are required to depths of down to 250 ft., is announced by the Reich drill division of the Consolidated Pneumatic Tool Company, Limited, London, S.W.6. It is powered by a Ford three-cylinder diesel engine, directly connected to a hydraulic pump which provides fluid power for the rotary drilling head, feed cylinders and the propelling motor.

FIG. 4.—CP 155 REICH DRILL.

Compressed air, which is used for the operation of the down-the-hole hammer and for air flushing of chippings, is provided by a CP 365-RO-2 compressor, delivering 35 cub. ft./min. at 100 lb./sq. in.

The operating principle of the drill is that a hydraulic motor of variable speed is carried in the slides of a retractable mast which can be positioned at almost any drilling angle. The motor transmits a constant torque at a given setting. A pneumatically-operated hammer is located at the end of a string of drilling rods, the hammer being designed for operation with bit sizes of 4½ in., 4¾ in., and 5 in. With this power combination the drill-head motor gives a high degree of torque for the most difficult conditions, while the down-the-hole hammer develops the maximum percussive effect immediately behind the bit, no energy being dissipated by the need to transmit the blow through a string of rods.

A feature of the new drill is the extensive use made of hydraulics, not only for driving the drill rod rotation motor, but also for such duties as providing the necessary degree of thrust for the rod string, for positioning the drilling mast, hoisting the rod string, and for propelling the rig around the drilling site.

US Mine-water Control Project Approved

APPROVAL of a joint State-Federal project to control mine water at the Delaware-Pine Ridge mine, near Wilkes-Barre, in the northern field of Pennsylvania's anthracite region, has been announced in the United States.

The project calls for installing four State-owned deep-well pumps—each with a rated capacity of 6,000 gal./min.—to supplement a pumping plant in the Delaware No. 2 shaft of the mine, owned by the Hudson Coal Company. The Commonwealth of Pennsylvania is supplying the pumps, which were installed several years ago under a State-supported mine-water control programme and are no longer needed at their present locations elsewhere in the anthracite region. The cost of moving the pumps and installing them in the Delaware No. 2 shaft is estimated at $155,000, which will be shared equally by the State and Federal Governments.

According to Bureau of Mines engineers who recommended approval of the project, installation of the four additional pumps in the Delaware No. 2 shaft will remove the threat of flooding adjacent mines. Two of these, the Glen Alden Corporation's Huber and Sugar Notch mines, contain many million tons of recoverable anthracite and are the principal units of operations that employ more than 1,800 men and produce nearly 3,000,000 tons of anthracite yearly. Failure to control water at the mine could lead to flooding of all remaining active mines in the western end of the field's Wyoming Basin.

Approval of this latest project brings the total number thus far approved to 22, of which 10 are for deep-well pump installations and 12 are for construction of surface works to divert water from underground mines. Total cost of the approved jobs is estimated at $7,400,000, which is being shared equally by the Commonwealth of Pennsylvania and the Federal Government.

Section Straightening Machine for India

CONTINUOUS straightening of rolled sections between two banks of suitably grooved and staggered rolls has long been general practice and, while the fundamental principles of the method have undergone little change, the details of design and construction have shown progressive improvement.

Joshua Bigwood & Son, Limited, of Wolverhampton, recently despatched to the Indian Iron & Steel Company, of Calcutta, a machine capable of straightening rolled steel joists up to 18 in. by 6 in.; channels up to 17 in. by 4 in.; angles up to 8 in. by 8 in. by 1 in.; and flat-bottom rails up to 105 lb./yd. weight. The machine is shown in Fig. 1 in comparison with the smallest machine in the Bigwood range (seen on the right). The power for the drive to the bottom straightening rolls and to the vertical spindle pinch rolls at the exit end of the machine is supplied by a 150-h.p. motor, direct-coupled to a two-speed totally enclosed reduction gearbox, which provides for pass speeds of 100 and 180 ft./min.

Heavy steel fabrications, into which steel castings for the bearing housings are welded, are used throughout and all are stress relieved. The straightening roll shafts are of alloy steel and are mounted in massive roller bearings. The top roll shafts are mounted in substantial chocks, vertical and axial adjustment being carried out by geared motors.

Large indicator dials on top of the machine show the vertical setting of the top rolls.

The reversing drum controller for the main motor, forward and reverse push button starters for the vertical and axial top roll adjustment and for the pinch roll setting, are mounted on a control desk which will be placed in a position relative to the machine convenient to the operator. The reduction and distribution gears are spray lubricated; the roll shaft bearings run in oil, and other bearings are grease lubricated by means of a Farval manual system.

A repeat order is now in hand for a second machine of the same type.

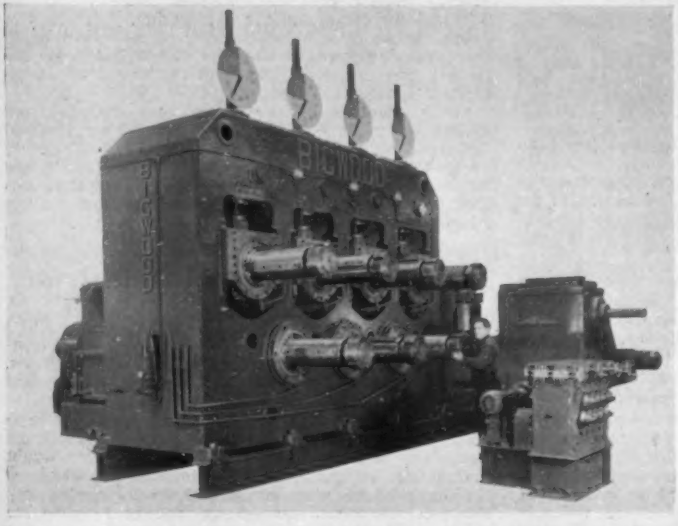


FIG. 1.—BIGWOOD STRAIGHTENING MACHINE FOR HEAVY ROLLED SECTIONS.

Orders Placed

East Germany Orders Ethylene Plant

ORDER to provide East Germany with the design and detailed engineering of an ethylene plant, with a capacity of 40,000 tons annually, has been won by Humphreys & Glasgow, Limited, London, S.W.1, and Petrocarbon Developments, Limited, London, W.1. Total East German expenditure on the plant's first stage will be about £1,500,000 and the completed plant will cost about £4,000,000, but the value of the order will probably be more since the two companies are responsible for design and technical knowledge as well as the provision of the actual machinery and equipment.

The contract for the first phase of the order, including the provision of process design and technical engineering requisitions, was signed in London by representatives of the East German foreign trade corporation "Dia-Chemieausrüstungen" and the two UK companies.

Work will begin immediately and the first phase is due for completion in December, 1962. Many of the contracts for the supply of plant and equipment will be placed in the UK.

AN ORDER FOR 300,000 tons of bituminous coal—South Africa's first major coal export for 10 years—has been received by Natal Associated Collieries, Limited, from Burma.

THIRTEEN AIR COOLERS and condensers for the new Turkish oil refinery at Mersin are to be supplied by Daniel Adamson & Company, Limited, Dukinfield (Ches).

A CONTRACT FOR £325,000 has been awarded to the Lilleshall Company, Limited, of St. George's, near Oakengates (Salop), by the Government of Kuwait for the supply of 12 steel-framed buildings.

MACHINERY FOR a new soap factory in Moscow has been ordered from Adams Powel Equipment, Limited, Gateshead. The machinery will pack bars of soap at the rate of 800 a minute into boxes and cartons and glue and seal the containers ready for dispatch. The order is worth £20,000.

THE FIFTH REPEAT ORDER from Denmark has been placed with the English Electric Company, Limited, to supply the Danish State Railways with control equipments for use on the 1,500 d.c. electrified section of the Copenhagen suburban lines. This brings the total of motor-coach equipments supplied to Denmark by the company to 119.

CONTRACT VALUED at £10,000 has been secured against tender by Griffin & George, Limited, Alperton (Middx), to supply scientific equipment for the laboratories of the new mid-Hertfordshire College of Further Education, at Welwyn Garden City (Herts). The order includes the complete scientific equipment for the college, except for certain very specialized pieces.

LATTICED STEEL TOWERS which will carry a 275-kV. transmission line between Beauly and Kintore for the North of Scotland Hydro-Electric Board are to be manufactured by William Bain & Company, Limited, Coatbridge. The company has received the order from the J. L. Eve Construction Company, Limited, which is to carry out the main contract for the Hydro-Electric Board.

Metal Industries Closes Offer for Lancashire Dynamo

AT the extended closing date (last Friday) of its offer for the capital of Lancashire Dynamo Holdings, Limited, Metal Industries, Limited, had acquired £2,806,269 ordinary, or 96½ per cent. of the total in issue, and £530,070 5½ per cent. cumulative preference—94½ per cent. The closing date will not be extended again, but all outstanding stock will be acquired compulsorily.

Assuming these arrangements are duly completed, and subject to the extra-ordinary and special resolutions being duly passed at meetings to be held on March 3, the issued share capital of Metal Industries will total £8,761,758, comprising £1,212,000 in 5 per cent. cumulative preference, £1,560,000 in 3½ per cent. cumulative preference, and £5,989,758 in ordinary shares.

The board feels it should dispel a misapprehension which seems to have arisen in regard to market purchases of stock in Lancashire Dynamo. The total cost of the shares purchased in this way was rather less than the same shares would have cost if acquired on the basis of the offer, it is stated.

POWER-GAS REVERSES DECLINING TREND

ORDERS booked by the Power-Gas Corporation, Limited, in the year ended September 30, 1959—£7,750,000—were considerably lower than in any of the preceding five years, states the chairman, Mr. W. R. Brown, in his annual review. However, since the General Election and the upswing in international trade, inquiry has been brisk and in the first four months of the current year new orders totalled £9,300,000.

While the iron and steel industry has been the group's biggest post-war customer there is now a growing interest in nuclear engineering.

Mr. Brown is at present unable to add anything to the previous statement that the board has been discussing merger possibilities with the board of Davy-United, Limited.

Gross earnings of the group rose sharply from £1,380,186 to £1,857,713, but it cannot be assumed the trend will continue as some of last year's profit arose from orders dated as far back as 1955. The balance attributable to the parent company was £780,810 (£532,107) and the dividend is raised from 20 per cent. to 30 per cent.

BISF President and Industrial Prospects

FORECAST of a "ripe future" for the steel, electrical, and other industries was made by Mr. Richard Summers, president of the British Iron and Steel Federation, last Friday.

Speaking at the annual dinner of the North Staffordshire Sub-Centre of the Institution of Electrical Engineers, Mr. Summers said: "There is no doubt that as our standards of living increase the demands for our products also increase. I see no reason why this increase should not go on, and so long as the country is prepared to restrict inflation, there is a ripe future for our industries."

Obituary

DR. Z. K. A. MOSZYNSKI

BCRA's Principal Scientific Officer

BY the death on February 13 of Dr. Zbigniew Konrad Antoni Moszynski the British coking industry, particularly in the field of research, has lost one of its leading scientists. He was 52. His earlier work was done in his own country of Poland, but after war service he joined the staff of the British Coke Research Association in 1947, became its senior scientific officer two years later and its principal scientific officer in 1954.

At the former Midland Coke Research Station of BCRA Dr. Moszynski was in charge of personnel and acted as secretary of a research group doing important work on the determination of chlorine in coal. His bomb combustion method for the determination of both the sulphur and chlorine content of coal is well known to fuel scientists and is to become an international standard method.

With the building of the new research centre at Chesterfield (Derbyshire) in 1955 he took up new work for the association dealing with the problems of atmospheric pollution. During the war he served first with the Polish Army, was then interned in Hungary, and evacuated to England in 1940. From 1941 to 1947 he was attached to the Parachute Brigade, Polish Forces, and as a captain was assigned to the Polish General Staff.

On its behalf he carried out research work in the Mining Department, University of Birmingham, on the use of carbonized peat/coal blends for mobile gas generators. In 1946-47 he extended this work on the production of reactive carbonized fuels in the Fuel Department of Leeds University where he obtained the degree of Ph.D.

DR. W. F. P. McLINTOCK

DIRECTOR of the Geological Survey and Museum of Practical Geology from 1945 to 1950, Dr. William Francis Porter McLintock died on Sunday. He was 73. He began his career as an assistant curator at the museum in 1907 and gradually built up a considerable reputation in the sphere of research in a number of geological fields.

He helped to organize the Atomic Energy Division of the Geological Survey between 1939 and 1945 and, thanks to his exceptional foresight and careful planning, he was fully prepared for the reorganization of the scientific Civil Service in 1946, presenting an exact and logical scheme for the development of the survey and the museum in terms of both work and staff. He retired in 1950.

The death occurred on February 12, of Mr. R. C. SIMPSON, publicity manager of Newman, Hender & Company, Limited, ironfounders, Stroud (Glos).

The death has occurred at Ossett (Yorks), of Mr. GEORGE TUNSTALL formerly head electrician at Old Roundwood Colliery (Yorks). Mr. Tunstall was 90.

Mr. DAVID BRIDGE, who died on Saturday at the age of 79, was the founder and former chairman of David Bridge & Company, Limited, specialist engineers to the rubber, plastics, and cablemaking industries, of Castleton (Lancs).

The death has occurred of Mrs. ANNIE BRYERS, a director of John Crown & Sons, Limited, Sunderland, from 1924 until 1946, when the shipyard was acquired by Joseph L. Thompson & Sons, Limited. Two of her sisters were also directors. Mrs. Bryers was the widow of Mr. Charles Bryers, a consultant engineer in Sunderland and Newcastle.

Recognized as one of the best designers of his class, Mr. GEORGE MATTHEW BROWN, consulting electrical engineer to the United Steel Companies, Limited, for many years, died on Monday. He was 88. He became well known soon after the first world war when he designed the electric drive for one of the first Templeborough cogging mills in the country. He retired just before the last war.

Mr. GEORGE HENRY GREEN, chairman of Eliza Tinsley & Company, Limited, manufacturers of chains and builders' ironwork, of Old Hill (Staffs), has died at the age of 89. He spent all his working life with the firm, and was appointed chairman when the limited company was formed in 1949. He was also chairman of Swindell & Company, Limited, edge and garden tool manufacturers, Dudley, and was a past-president of the Edge Tool Manufacturers Association.

Death occurred on Saturday after a long illness of Sir DAVID RANDALL PYE, FRS. He was 73. Sir David gained engineering experience with Mather & Platt, Limited, the Manchester textile and electrical engineers, etc., and was Lecturer in Engineering Science from 1909 to 1914. From 1919 to 1925 he was Lecturer in Engineering at Cambridge University, after which he was Deputy Director of Scientific Research at the Air Ministry until 1937, when he became Director for the next six years. Sir David was president of the Institution of Mechanical Engineers in 1952-53.

Major WILLIAM HENRY CADMAN, well-known internationally as an authority on carbon black, died on Saturday aged 79. He was the third son of Mr. James Cope Cadman, a well-known mining engineer in north Staffordshire. He established a research laboratory for the Anglo-Persian Oil Company, Limited, to investigate the best way of using the natural gas from oilwells in the manufacture of carbon black, and from 1930 until his retirement in 1948 he was

largely responsible for the production of carbon black and projects associated with oils from coal and shale for the Anglo-Iranian Oil Company, Limited.

Mr. JOHN W. WOOD, managing director of the Uskside Engineering Company, Limited, Newport (Mon), died on Sunday. He was considered to be an expert on colliery engineering matters. Mr. Wood joined Uskside Engineering, now a subsidiary of the Guest Keen & Nettlefolds group and one of the oldest works in Monmouthshire, as a designer draughtsman in 1920. Fifteen years later he became general manager. In 1941 he became a director and five years later was appointed joint managing director. He had been managing director since 1950. For the past two years Mr. Wood had also been a director of Welsh Metal Industries, Limited, Caerphilly (Glam).

One of the pioneers of the electrical industry, Mr. MILTON VICTOR ELY, has died at the age of 87. He was chairman of Foster Transformers, Limited, and Foster Electrical Supplies, Limited, both of which are subsidiaries of Lancashire Dynamo Holdings, Limited, and was formerly a director of the parent company. He played a leading part in the formation of the Electric Lamp Manufacturers' Association. Mr. Ely, who retired from the Lancashire Dynamo board in 1955, formerly played football for Wimbledon F.C., the Isthmian League club, and was also a keen golf, tennis, and squash player.

Swedish Steel Output at Record Levels

LEVELS of production, exports, and imports in the Swedish steel industry were all at record levels in 1959, it is reported from Stockholm. The quality of Sweden's steel and her stressing of the upper grades is proved by the fact that, although imports of commercial grades of iron and steel were higher than exports by as much as 80 per cent. over the year, the total worth of these imports stood at only 670,000,000 Swedish crowns, as against exports worth 722,000,000 crowns. Total 1959 production of base products was 1,400,000 metric tons of pig-iron, or 7 per cent. more than the 1958 figure of 1,310,000 tons, and 2,860,000 tons of cast steel—more by 18.4 per cent. than the 2,410,000 tons produced in the previous year.

Investments in the Swedish iron and steel industry over last year are estimated at 360,000,000 crowns, as against primary estimates for the current year of 482,000,000 crowns.

BIDS FOR REDLER INDUSTRIES INCREASED

BID for the ordinary capital of Redler Industries, Limited, is again increased by Ley's Foundries & Engineering Company, Limited, which made the original offer. It is now offering 14s. 6d. (13s. 6d.) per 4s. share and is extending the expiry date to Monday.

It is also to make an exchange offer for the Redler 7 per cent. redeemable £1 preference on the basis of £6 of Ley's 6 per cent. £1 preference for every five shares.

This offer was followed by a further bid by Cozens & Sutcliffe (Holdings), Limited. It is adding 1s. in cash to its previous share-for-share exchange offer. Cozens & Sutcliffe ordinary was quoted at 16s. 6d. at the time of the offer.

Hadfields' Group Order-book "Highest for Years"

INFLOW of commercial orders to the Hadfields, Limited, group of steelmakers and engineers, showed a "most satisfactory" upsurge after the General Election, reports Lord Dudley Gordon, the chairman. He said that the present order-book stood at a higher figure than for many years.

The increase includes some of the specialities for which demand had fallen during the year to October 3, 1959, as well as the production of bars and billets in the rolling mills, which demanded an increase in steel smelting. Full-time working had been resumed in most departments, the chairman adds, although it did not seem likely that demand for steel castings would reach the level of former years.

Before tax, group profits fell from £609,005 to £486,536 in 1958-59 with the repeated 6 per cent. dividend on February 4. Short-time workings in certain units adversely affected margins. This resulted from the falling-off in demand for some specialized products, although the order volume improved in the later stages. Export trade was described as "comparatively healthy."

Iron-ore Imports

THE appended table shows the tonnage and value of imports of iron ore and concentrates (except chrome iron ore and roasted iron pyrites) in January, 1960, and gives comparative figures for January, 1959.

From	Month ended January 31.		Month ended January 31.	
	1959.	1960.	1959.	1960.
	Tons.	Tons.	£	£
Sierra Leone	63,250	65,690	276,270	303,591
Canada	51,075	124,285	217,694	490,296
Other Commonwealth countries and Eire ..	1,202	3,450	4,944	14,100
Sweden	267,223	371,903	1,709,872	1,996,737
Norway	25,822	40,214	144,839	213,102
France	26,652	41,187	111,139	137,742
Portugal	14,430	40,517	59,464	156,906
Spain	37,578	42,524	192,004	179,482
Algeria	174,075	180,605	983,227	824,507
French West Africa ..	14,724	—	55,537	—
Tunisia	83,229	49,695	469,214	225,657
Morocco (excl. Tangier)	45,426	69,975	235,331	367,059
Liberia	33,100	61,300	191,541	312,259
Venezuela	122,808	160,194	720,321	920,285
Brazil	55,782	41,355	420,276	293,686
Other foreign countries	—	60,199	—	219,874
TOTAL	1,016,376	1,353,093	5,791,673	6,655,283

European Record for Distington Engineering

LAST week's output of 2,520 tons of finished castings by the Distington Engineering Company, Limited, a branch of the United Steel Companies, Limited, included 439 ingot moulds.

It is claimed to be the first ingot mould foundry in Europe to produce over 2,500 tons of finished castings in one week.

THE LARGEST COAL ORDER to be placed in Canada by Japan has gone to the Crowsnest Pass Coal Company, Limited, which will supply 225,000 tons of coal to the Japanese steel industry.

Company News

ENGLISH ELECTRIC'S PROSPECTS

Confidence in Conventional and Nuclear Fields

"WE have every reason to look to the future with confidence," states Lord Nelson, chairman of the English Electric Company, Limited, group, in his annual review. Economic indicators both in this country and oversea seemed to point generally to a further rise in activity in 1960, "which may well be a good, though not spectacular year." Long-term trends show world consumption of electrical power to be growing at the rate of 7 or 8 per cent. per annum, and there should, therefore, be an increased demand for the company's products in the years ahead.

With the resurgence of manufacturing activity in western Europe and Japan there is over capacity in relation to world demand for the products of heavy electrical industry and in this field, particularly, competition is fierce, prices keen, and margins even narrower than hitherto. In many parts of the world where conventional fuels are still readily and cheaply available atomic power will not yet be as economic, but the group believes that in the long term oversea demand might be substantial.

Referring to the major changes in the aircraft industry, Lord Nelson states that the aero engine business of the subsidiary, D. Napier & Son, Limited, incurred a trading loss of £1,200,000 which had been met by a subvention payment from the parent company. A substantial improvement was expected during 1960.

Turnover of the group increased substantially in 1959 and the volume of business has doubled since 1953. The net profit attributable to the parent is £3,125,870 (£3,017,258), after a lower tax charge of £2,575,466 (£2,919,414), and the dividend is 10 per cent. against the equivalent of 9¼ per cent.

CONSOLIDATED SIGNAL COMPANY, LIMITED—Net profit rose from £45,387 to £53,382 in the year ended September 30, 1959, and the dividend is raised by 5 per cent. to 45 per cent.

FORDHAM PRESSINGS, LIMITED—The company is increasing the ordinary dividend to 33⅓ per cent., from 27½ per cent., and proposes a one-for-two scrip issue. Group net profits are £119,771 (£103,572), before tax.

HENRY BALFOUR & COMPANY, LIMITED, gas and chemical engineers, etc., of Leven (Fife)—A final dividend of 11½ per cent. makes 18 (17) per cent. for the year to October 31, 1959. Group profit was £142,201 (£136,763), less tax of £50,077 (£61,750).

F. W. BERK & COMPANY, LIMITED, chemical manufacturers, bonding clay specialists, of London, W.1—In view of recent Press reports, the board announces that no offer has been made and no negotiations are in progress for the purchase of the company's capital.

IMPERIAL ALUMINIUM COMPANY, LIMITED—The company, a subsidiary of Imperial Chemical Industries, Limited, has acquired the 69,400 ordinary £1 shares of Invicta Foil & Cheswright & Nicholls, Limited, an exempt private company manufacturing aluminium foil at Barking (Essex).

VENT-AXIA, LIMITED, ventilation specialists, of London, S.W.15—A dividend of 20 per cent. for the half-year to September 30 is announced by the company, which is a subsidiary of Hall-Thermotank, Limited. For the year ended March 31, 1959, a total dividend of 40 per cent. was paid.

NICO LIGHT ENGINEERING COMPANY, LIMITED—A formal offer for the company's 108,251 10s. shares at 12s. a share has been received from the General & Provincial Investment Trust, Limited. The directors, who have accepted in respect of shares held by them or their families, recommend acceptance by other holders.

NORTON INDUSTRIES, LIMITED, ironfounders, engineers, etc., of Wolverhampton—With an unchanged final payment of 15 per cent., the dividend is held at 20 per cent., plus a tax free capital dividend of 13 1/13 per cent. (nil). Group profits for the year ended October 31 were £87,535 (£52,601), after tax of £84,045 (£48,122).

ATLAS COPCO AB—Net profit for 1959 was £558,043, against £489,149 in 1958 and the dividend of 10 per cent. is repeated plus a bonus of 2 per cent. (nil). The board proposes to increase the capital from £3,375,818 to £4,340,337 by transferring £964,519 from the appropriation account and making a two-for-seven scrip issue.

MATHER & PLATT, LIMITED, electrical and textile engineers, etc., of Manchester—Consolidated trading profits recovered from £1,435,344 to £1,522,972 in 1959, and the year's dividend is brought up to 11 per cent. with a final of 8 per cent., comparing with the previous equivalent of 10¾ per cent. There was a one-for-two scrip issue in 1958.

NEWMAN, HENDER & COMPANY, LIMITED, foundrymen, etc., of Stroud (Glos)—Under the rights offer of 753,239 ordinary 10s. shares, holders took up 749,194 shares. Applications for 171,999 additional shares were received for the 4,045 shares available. In the allotment of these, preference was given to the smaller applications on a scaled-down basis.

C.V.A. JIGS, MOULDS & TOOLS, LIMITED—It is proposed to change the company's name to Kearney & Trecker-C.V.A., Limited. The board expects that the addition of Kearney's name will assist oversea sales. The chairman, Sir John Eldridge, says that the recession affecting the machine-tool industry appears to have abated and there are signs of an increasing demand for the group's products.

WILMER LEA FOUNDRIES (HOLDINGS), LIMITED—The board has been informed that it will shortly receive a formal offer from Charles Karen & Son (Holdings), Limited, to buy the company's 3,000,000 1s. shares at 9d. a share in cash. The deal will involve £112,500.

The directors intend to accept in respect of their own holdings and to recommend other holders to do likewise, subject to agreement on details.

CASHMORE SPARROW (STEEL SHEETS), LIMITED—The company has been formed with premises at Mossley, near Manchester, by John Cashmore, Limited, Great Bridge, Tipton (Staffs), and Roberts, Sparrow & Company, Limited, Wolverhampton. The companies have an equal share in the new business, which has been formed for the development of their business of steel sheet stockists in the north of England and Scotland.

NORCROS, LIMITED, holding company for engineering and ironstone property concerns, etc., of London, W.C.2—The chairman, Mr. J. V. Sheffield, reports a profit of £1,362,470 for 17 months against £680,000 for the previous year. Net profits were £790,000 compared with £305,582. Final dividend of 20 per cent. makes a total for the 17 months equivalent to 40 per cent. on the ordinary capital doubled by the one-for-one bonus last May.

INTERNATIONAL HARVESTER COMPANY OF GT. BRITAIN, LIMITED—At the end of the first quarter of the fiscal year, the company reports sales 56 per cent. ahead of the same period last year, mostly accounted for by greatly increased export sales, affecting both of the company's main product groups. Crawler tractors and construction equipment are, overall, 70 per cent. ahead of the same period of the record 1959 year, while export figures for crawler tractors alone show a 200 per cent. gain.

WEBLEY & SCOTT, LIMITED, engineers and machinists, of Birmingham—After considering the accounts of Arusha Industries, Limited, for the 15 months to September 30, 1959, and those for the six months to the same date of Webley & Scott, the Shareholders' Committee advises Webley holders to accept the Arusha offer for the shares. Members are told that although the committee is still not satisfied that acceptance is in the best interests of holders, it feels that there is no more to be gained by remaining as minority shareholders and therefore recommends acceptance of the Arusha offer.

ENGLISH CHINA CLAYS, LIMITED—The directors expect to maintain the present rate of dividend at 8¼ per cent., tax free, for the current year on the capital increased by the recently proposed one-for-five scrip issue. During the year ended September 30 the level of china clay sales exceeded the record 1957 figure by about 7 per cent., establishing a new record for the clay division. Exports have again increased during the year, due, to a certain extent, says the chairman (Sir John Keay), to easier sea freights, a factor upon which the effectiveness of the company's ability to compete depends. Deliveries in the home market have shown a welcome increase, he says.

EVERED & COMPANY, LIMITED, metal rollers, manufacturers of brass and copper tubes, etc., of Smethwick—The company announces that its holding of shares in the Midland Employers' Mutual Assurance Company was recently acquired by the Eagle Star Insurance Company in exchange for Eagle Star shares. These shares have been sold and from the resulting surplus of £87,704 the directors have decided to distribute £48,125 in the form of tax-free cash distribution of 1s. 3d. per £1 ordinary share to holders of February 22.

JOHN FOWLER & COMPANY (LEEDS), LIMITED, manufacturers of tractors and locomotives, etc.—The chairman, Mr. A. Carr, said that improved sales in the locomotive division were being sought now that the company has made models covering a wider range. The board felt that the decision to bring this division up-to-date would ultimately benefit its trading, although keen world competition must not be overlooked. In the heavy crawler tractor field, world competition was again increasingly severe and the profit margin was very lean, even though a substantial export order had recently been secured. Signs of further oversea business were apparent and every effort was being made to bring these prospects to finality in the current year. But because of international trading difficulties, it was impossible to forecast the possible results.

W. H. DORMAN & COMPANY, LIMITED, manufacturing engineers, etc., of Stafford—The company is resuming interim dividends with a declaration of 2d. per 2s. ordinary share, or 8½ per cent., on account of the year ending March 31, 1960, and forecasts at least a similar final. A single payment of 2d. per ordinary was made for the previous year. The last interim was in respect of 1956-57. The company reports that in the calendar year just ended as many engines were sold as in the previous two years combined. This allows the directors to look forward with confidence to a recovery in the final profit figure for the year ending next month. It is anticipated that the net profit, subject to tax, will not be less than £140,000, in which event it would be the directors' intention to recommend a final dividend no smaller than the interim payment now announced.

ALFRED HERBERT, LIMITED, machine-tool makers, of Coventry—Although group net profits dropped to £1,354,253 (£1,531,552) in the year ended October 31, 1959, the chairman, Col. C. W. Clark, states that in view of the more favourable position, the final dividend is raised to 5 (4) per cent. This makes 7 (6) per cent., tax free, for the year. There is in addition a capital distribution of ½ per cent. (nil) from realized capital profits. Improved demand accelerated throughout the year and profits are somewhat better than was expected a year ago. Monthly average value of orders received in the first quarter of the current financial year exceed the monthly average of orders for the previous 12 months by 32 per cent.; value of orders received in the first quarter was higher than that of any three-month period in the last four years.

Engineers' Shorter Week Starts Next Month

THE 42-hour week for engineering workers will take effect from March 28, it was decided on Thursday of last week when formal agreement was reached between the Confederation of Shipbuilding and Engineering Unions and the Engineering and the Allied Employers' Federation. The two-hour reduction in the working week was offered by the employers in response to the unions' demand for a pay increase and a 40-hour week.

The offer was accepted by the union. By agreement no hourly-paid worker will suffer loss of pay and there will be guarantees about the earnings of the majority of pieceworkers.

THE PRESSED STEEL COMPANY, LIMITED, has applied for planning permission to increase the size of its Swindon factory by 75 per cent. One of the shops at the plant is claimed to contain the most intensive collection of automated welding plant in this country. The company also announces that it has taken over the aviation interests and operation of the Oxford Airport at Kidlington. The D-H Dove aircraft acquired by Pressed Steel some months ago for executive travel between factories has operated from the airport.

IRON AND STEEL TRADE

IMPRESSIVE expansion of steel production and also of productive capacity is illustrated by last year's performance—more than 20,000,000 tons with a total capacity of 24,500,000 tons—and the confident raising of the industry's sights this year to 24,000,000 tons out of a projected capacity of 25,500,000 tons. Restocking is undoubtedly a strong contributory factor to increased consumption, but it is not regarded as a temporary phase, the joint plan of the steelmakers and the Iron and Steel Board being designed to raise capacity to over 30,000,000 tons by 1965.

Pig-iron

The further increase in pig-iron production is a necessary corollary to the further acceleration of steel outputs which is already clearly envisaged. Merchant blast furnaces can take care of foundry requirements, which are still on a subdued scale. But a regular flow of hot metal from the blast furnaces to the melting shops is essential and the basic iron producers are all working at full stretch.

Many of the ore-loading ports are still frozen, but as soon as they are freed from the grip of winter a big acceleration of shipments may be expected.

Ferro-alloys

A good demand is being maintained in most sections. Ferro-tungsten is unchanged in price, but is receiving steady attention. There is a fair demand for ferro-molybdenum and ferro-vanadium. Ferro-silicon is very active and both the low- and high-carbon grades of ferro-chrome are attracting support. Calcium silicide is steady, while ferro-manganese and silico-manganese are quite active.

Certain consumers continue to favour ferro-phosphorus and ferro-sulphide, both items being in steady request. There is a good demand for ferro-titanium, while ferro-niobium is well supported.

Semi-finished Steel

Prompt absorption of the larger tonnages now turned out by British steelmakers has been a common characteristic of the semi-finished steel trade for some time past and there is not the slightest indication of any imminent change unless it be for demand to display growing strength.

All the re-rolling mills have developed a steady rhythm and there is every promise of a continuation of these conditions, since the works are assured of full employment for some months to come.

Finished Steel

Approach of the spring and with it more favourable conditions for outdoor work promises still heavier pressure for deliveries of constructional material. This apart, there is no substantial change in the position, which shows a keen demand for flat-rolled products and heavy structurals and a subdued flow of specifications from the railways, collieries, and shipyards.

Expansion of sheet and strip mill capacity is a slow and a costly process, and it is feared that immediate shortages of supplies can only be overcome by bigger—and more costly—imports.

DURING A VISIT to Birmingham last Friday, Mr. F. J. Erroll, Minister of State, Board of Trade, inspected the works of Belliss & Morcom, Limited, manufacturers of steam turbines and engines, etc.

James Booth Aluminium Orders Big Rolling Mill

LARGEST rolling mill of its type in western Europe has been ordered by James Booth Aluminium, Limited, as the first part of its £5,000,000 re-equipment and expansion programme. It is expected to be in operation in the company's Kitts Green Works, Birmingham, during 1961.

The mechanical side of the new plant, costing about £1,500,000, has been ordered from Loewy Engineering Company, Limited, Bournemouth. It is designed to roll aluminium and Duralumin slab ingots weighing up to 6 tons, for the production of plate, sheet, and strip. Included in the plant is a reversing 4-high hot mill, 148-in. wide.

The new plant will augment the production capacity of all the company's flat-rolled products as well as providing much larger sizes of aluminium alloy plate, particularly to meet the growing demands of shipbuilding, chemical, aircraft, and atomic energy units.

The ordering of the new plant, said Mr. W. J. Vaughton, managing director, marked the first stage of a major development programme which, it was envisaged, would contribute to a great extent to meeting the increasing demand expected, especially from the building and chemical plant industries.

The development programme is being carried out by a newly-formed team of specialized engineers under the direction of Mr. D. H. H. Clarke, engineering director of the company. Contracts for other equipment, which will make the Kitts Green Works one of the most up to date in western Europe, will be placed shortly.

Spark Holdings in Takeover

ISSUED share capitals of Hall & Kay, Limited, T. R. Creffield & Son, Limited, and G. Hastings & Company, Limited, are being acquired by Spark Holdings, Limited, cerium metal and flint manufacturers, etc., for £88,244 cash and 1,650,000 shares of 1s. Total consideration is worth nearly £790,000.

On completion the cash portion is payable as to £35,744 and the balance of £52,500 by unsecured loan notes repayable over five years with interest at 5½ per cent. When the acquisitions are completed, the Spark group's issued capital will consist of £142,500, divided into 2,650,000 ordinary shares and 200,000 "A" ordinary shares of 1s.

Hall & Kay is a heating and air-conditioning engineering concern, of Ashton-under-Lyne, T. R. Creffield & Son, London, W.11, is engaged in gear-cutting and precision engineering, and G. Hastings & Company, Leicester, manufactures hosiery.

Coalfield News

More Manpower Wanted in Rhymney Area

HOPE that the Rhymney Area of the South-Western Divisional Coal Board would be able to step up its manpower from the present level of 13,500 to 15,000 in the next five years was expressed by Mr. George Tomkins, general manager of the Area, when he addressed a conference of youth employment officers and secondary school headmasters. One thousand men were lost through wastage last year in the Area, he said. "Unless this trend can be arrested and reversed it can imperil the future livelihood of a very large number of people of this Area who directly and indirectly depend upon coal mining," he warned.

Mr. Tomkins continued: "There can be little doubt that the chief obstacle to recruiting and the retaining of manpower is considered to be the general climate of public opinion concerning the industry, but I am satisfied that if the favourable position of the Rhymney Area is more widely known it will alter this climate. The Coal Board's revised plan indicates the confidence the board and the Government have in prospects for the Area."

TWO YORKSHIRE pit strikes over wage grievances —at Wharncliffe Silkstone and Skiers Spring collieries —ended following meetings held during the weekend.

COAL AND COKE TRAFFIC receipts of British Railways in January, at £9,700,000, were £26,000 higher than in January, 1959, and showed the first rise for a long time.

AFTER 53 YEARS looking after the ponies at the Rising Sun Colliery, Wallsend, Mr. Charles Gilson (67) retires today (Friday). His father was colliery horsekeeper before him.

PERMISSION HAS BEEN granted by the river Wear commissioners for Durham Divisional Coal Board to repair the Wearmouth stone berth. It has been in a state of disrepair for several years.

FATHER AND SON will draw their pensions from the same office with the retirement, at the age of 65, of Mr. Jim Beadman, a surface worker at Brookhouse (formerly Beighton) Colliery, Beighton (Yorks). Mr. Beadman's father is 90.

ABOUT 60 MINERS are to be transferred to Solway Colliery (Cumberland) from the St. Helens and Harrington No. 10 pits. They are some of the 300 Cumberland miners becoming redundant because of pit closures and increased mechanization.

PART OF A LARGE development and modernization scheme, a new 1,400 ft.-deep shaft has been sunk at the Rising Sun Colliery, Wallsend (Northumberland). It will be used for coal-drawing, while the No. 2 shaft will be used for carrying men and materials.

CONCERNED AT growing unemployment, a proportion of which is due to the closing down of Forest of Dean collieries, North Gloucestershire Trades Council has sent a telegram to the four Gloucestershire MPs asking for the area to be scheduled for industrial development.

RECENT VISIT of the Minister of Power to Northumberland is covered in the March issue of Mining Review, the NCB's newsreel, which also includes items on the use of coal at a foundry manufacturing domestic stoves and on Bobby Charlton, the Manchester United and England footballer.

TO HALT THE DECLINE in attendance at Durham miners' gala over the past few years, the county's pit holidays are to be rearranged. More than half the 90,000 miners in the county have previously been on holiday during the gala, but from next year no pit will be on holiday on gala day.

THE PIT PONIES PROTECTION SOCIETY states that although a number of pits have been closed, there has been no great reduction in the number of horses and ponies working in collieries. There were 9,400 at work in 1959, compared with 10,500 in the previous year—the normal reduction due to mechanization.

IMPORTS OF coal, coke, and briquettes into the United Kingdom in January totalled 4,923 tons and were valued at £39,828. January, 1959, imports amounted to 57,294 tons, the value being £501,423. Of last month's imports, 4,155 tons came from Commonwealth countries and Eire and 768 tons from other foreign countries.

TEAM AND INDIVIDUAL events will figure in the first-aid competition to be run by the North Staffordshire Area of the West Midlands Divisional Coal Board at Fenton on March 19. Colliery teams each of four members and a reserve, will take part in an "accident" scene, and there will be individual practical tests and oral examinations.

HARDWICK AND GRASSMOOR coking plants in Derbyshire may soon be manufacturing "Warmco." The chairman of the East Midlands Divisional Coal Board has told Chesterfield Rural Council that the turnover at Hardwick to the manufacture of activated "Warmco" was scheduled for the end of next month. If the turnover was successful it was intended to complete a similar changeover at the Grassmoor plant.

TO MARK HIS 54 years' service in the mining industry, presentations were made to Mr. William Thomson last week by Mr. T. J. Macoustra, manager of Muircockhall Colliery, Townhill (Fife). Mr. Thomson has recently retired. At another Fife colliery, Bowhill, Mr. James Balfour has retired after 50 years in the industry. He went to work as a blacksmith at Bowhill in 1911. A presentation was made by Mr. Charles Robertson, the colliery's assistant chief engineer.

"A SOMEWHAT DISTURBING DECLINE" in recruitment to the coal mining industry in all areas except Retford and Worksop is shown in an analysis of first employments taken up by all county school leavers in Nottinghamshire. Details are given in the annual report of the county youth employment service for 1958-59. Percentage in the Retford district was 11.8, against 3.2 in the previous year, and in the Worksop district, 25.3 (20.7). Elsewhere, the decline was general. The report adds: "In view of the healthy state of the industry in the Nottinghamshire area, this trend is unfortunate."

Amble Coal Shipments: Mr. Graham Replies to MP

LETTER from Lord Lambton, MP for Berwick, on the decline of coal shipments at the Northumberland port of Amble, has been replied to by Mr. Leslie Graham, chairman of the Northern (N&C) Divisional Coal Board. It is estimated that coal shipments from Amble are falling by 150,000 tons a year.

In his reply, Mr. Graham said that the board was concerned about the position and would try to secure for the port as much trade as possible. During coal shortages, customers took supplies from any port, even when this meant extra cost. Under present conditions, buyers insisted on deliveries from ports where costs were most favourable.

Mr. Graham's letter is to be considered by Amble Urban Council.

THE COAL TRADE

DELAYS to deliveries of both industrial and domestic fuels continue to occur. The weather in some parts has been responsible for hold-ups, but the main factor would appear to be a shortage of railway wagons. Retail merchants generally have to keep householders waiting for supplies and there are many complaints in the trade on this account. Most of the larger industrial concerns have fair stocks at their command, but most of them would welcome increased deliveries.

DERBYSHIRE

Pressure for delivery of household coals continues and all grades are in firm demand. There is a steady call for best and hand-picked qualities and the better types of screened cobbles and brights are keenly sought. Cheaper brights are also in demand and supplies are fair. Best large nuts are improving and a ready market enables all arrivals to move away without delay. Washed medium and small nuts continue popular, and orders are being met fairly promptly.

The demand for domestic coke nuts continues high, and while good stocks are available, delays in delivery are unavoidable due to transport limitations. Domestic anthracites are very scarce, but "Phurnacite" is still fairly readily obtainable. Premium smokeless fuels continue to attract more attention.

Industrial demands are rising with the cold weather, and all transport is busily coping with current commitments. Nutty slacks are promptly available and hard steams are in firm demand with all available tonnages readily taken up. Washed fuels are keenly sought. Dry screened nuts are also in demand, and all available tonnages, together with additional supplies from colliery stacking grounds, are promptly sold. The call for all grades of hard and gas coke continues, and they are comparatively easy despite wagon shortages.

South Wales Miners Call for More Nationalization

CALL for strict adherence to the Labour party constitution over full-scale nationalization was made on Tuesday by the executive of the South Wales Area of the NUM. A resolution to the national executive was passed on behalf of the 90,000 miners in the Area. It said: "We are of the view there should be no whittling down or weakening of Clause 4, Section 4, of the party constitution." This extract of the constitution reads: "To secure for workers by hand or by brain the full fruits of their industry upon the basis of common ownership of the means of production, distribution, and exchange."

Mr. Will Whitehead, union Area president, commented afterwards: "For some time, South Wales miners have gone on record through annual conferences as favouring an extension of nationalization. Our opinion will be received when our executive meets on March 10, but the national executive may defer consideration until any other resolutions similar to ours from other union Areas are received."

He added that he hoped the resolution would be a tonic to Mr. Bevan and help his convalescence. "We stand firmly for more nationalization and not less," he said. "We hope miners in other parts of the country will support us."

Further Moves on Marketing of Ruhr Coal

GIVING its reasons for the rejection last week of the Ruhr coal producers' claim for a coal marketing syndicate, the High Authority of the European Coal and Steel Community has stated that such a syndicate would not fall under Article 65 of the ECSC Charter. The Article makes it the duty of the High Authority to allow restrictions of competition when they result in a noticeable improvement in production or distribution, when it is necessary for the reaching of these goals, and when the undertakings concerned do not gain so much economic power as to control prices, production, and sales of a "considerable part" of the total ECSC output or to influence the competitive powers of other concerns. The Authority considers that the proposed syndicate would be counter to the third of these conditions.

The Authority has, however, made it clear that it would be prepared to discuss modified suggestions for the formation of a sales body for Ruhr-produced coal. An Authority statement states categorically that "taking into account the changed position of coal in the energy market, the Authority does not consider it desirable that the existing coal marketing organizations should be abolished without some replacement." Further negotiations are therefore to be held between the Authority on the one side and the West German Government and the Ruhr producers on the other.

The contracts of the three existing coal marketing boards on the Ruhr, which bear the names Präsident, Geitling, and Mausegatt, expire on March 31. Following this the producers had asked for permission to set up a sales syndicate, while the Authority had hoped for some sort of sales set-up similar to that of the three companies. The idea of a syndicate was supported not only by the producers on the Ruhr but also by the mineworkers' union, IG Bergbau, which has put its case for a unified sales system to the Authority. The producers are at the same time united with the unions in the fight to have sanctions imposed on the competitive fuel-oil industry by the Federal Government.

Meanwhile, the ECSC Court, sitting in Luxembourg, rejected the claim made by the Ruhr producers against the Authority decision that the common office of the three marketing companies should no longer be permitted to operate after March 31, and that the three companies themselves should lose their identity as from that date. The claim was not acceptable in the form it stood, it was decided.

METAL CLOSURES (SOUTH AFRICA) (PTY.), LIMITED—Mr. Keith D. Erskine, chairman of Metal Closures, Limited, has been appointed a director.

News in Brief

RICHARD THOMAS & BALDWINS, LIMITED, has appointed Sir Percy Thomas & Son, in association with Gollins, Melvin, Ward & Partners, as joint architects for the company's new Spencer Works at Llanwern, near Newport.

THE JAPANESE concern, Kobe Steel Works, has signed a contract with the foreign trade outlet of the Soviet Union, under which the Kobe firm will supply Russia with 1,000 tons of seamless tubes worth some 1,200,000,000 yen.

SEVEN ACRES OF LAND for proposed works extensions have been bought by Churchill Gear Machines, Limited, machine-tool manufacturers, of Blaydon-on-Tyne (Co. Durham), from Blaydon Urban Council at a cost of £1,750.

NINETY TWO draughtsmen and tracers at the drawing office of the Steel Company of Wales, Limited, Port Talbot, on strike for a week over a 10 per cent. pay claim, returned to work on Monday to enable negotiations to begin on their claim.

THE ORE-CARRIER CRINAN, built by Charles Connell & Company, Limited, was launched at Scotstoun last week. The second ship to be built by the company for Scottish Ore Carriers, Limited, the Crinan will act as a cadet ship, carrying 12 deck apprentices.

THE FOURTH International Congress on Coal Preparation is to be held at Harrogate, from May 28 to June 1, 1962. The organization of the congress is being undertaken jointly by the National Coal Board and the Coal Preparation Plant Association.

SO THAT NEGOTIATIONS on a claim by 50 men for increased bonus payments can be started, the 1,600 men who struck on Thursday of last week at the Edmonton (London) factory of the British Oxygen Company, Limited, returned to work on Monday.

IN WEST GERMANY, one of the countries in which mineworkers have been most badly hit by the coal crisis, over 14,000 mineworkers are reported to be needed for vacant positions. The workers are sought by pits in the Aachen coalfields and in other parts of North-Rhine Westphalia.

STOCKSBRIDGE WORKS of Samuel Fox & Company, Limited, had a record output in the week ended February 13 of 8,943 ingot tons of steel. This was 249 tons better than the previous record set up three months earlier. The No. 2 melting shop had a record of 3,134 tons in 42 casts.

TUBE WORKS at Landore of Stewarts and Lloyds, Limited, will close in September or soon afterwards. Many of the 100 workers at Landore have already been transferred to the Corby works, and orders for Landore have fallen. The remaining employees have not yet been given notice.

IN ORDER TO EXPAND its output of motor components, the Concentric Manufacturing Company, Limited, has purchased a three-acre site at Sutton Coldfield (Warwickshire). The buildings, formerly a laundry, cover about 40,000 sq. ft. Possession of the new premises will be taken on April 1.

CLAIM FOR an average wage increase of £2 10s. has been lodged with individual managements by apprentices in shipyards, engineering shops, and foundries in Greenock and Port Glasgow. Starting basic wage for apprentices is now £2 7s. 6d. a week at 15 rising to £6 7s. 8d. at the age of 20.

CHEPSTOW URBAN COUNCIL has approved a top-speed top-priority scheme to build 300 houses for employees at the new Spencer Works of Richard Thomas & Baldwins, Limited, at nearby Llanwern. The council has also decided to open negotiations for an extra 26 acres of land for housing.

FORMAL OPENING of an extension to the factory of L. Sterne & Company, Limited, manufacturers of refrigerator components, of Hillington, Glasgow, was performed by Lord Polwarth, chairman of the Scottish Council (Development and Industry), on Thursday of last week. The extension is the company's fourth since the war.

THE 180 PLATERS who stopped work on February 12 and 15 as a protest against the refusal of Vickers-Armstrongs (Shipbuilders), Limited, Walker, Newcastle-upon-Tyne, to grant their claim for increased piecework rates, have abandoned their plan for a one-day strike each week and decided to reopen negotiations with the company.

ARRANGEMENTS HAVING BEEN MADE for a conference with the management concerning the employment of unskilled workers in the toolroom, the 1,400 workers who came out on strike at the factory of British Timken, Limited, manufacturers of roller bearings, etc., at Dunston (Northants), called off their unofficial strike on Thursday of last week after one day.

EIGHT MEN were injured by an explosion of 170 tons of molten steel at the Grimesthorpe foundry of the English Steel Corporation, Limited, on Thursday of last week. The accident occurred during the casting of a housing for a rolling mill. The men were waiting for the casting to cool after a ladle of white-hot steel had been poured in, when the mould suddenly erupted.

GIFTS TOTALLING £150,000 were distributed among the 1,600 employees of Thermotank, Limited, air conditioning engineers, etc., of Glasgow, to mark the change-over of the firm from a private family concern to a public company following the merger with J. & E. Hall, Limited, last June. Each gift was accompanied by a personal note from the chairman, Mr. Iain M. Stewart.

THE BEAUTY OF CRAFTSMANSHIP, the magic of liquid steel, and the majesty of the mineral mine, above and below ground—these are some of the facets of industrial activity brought alive by colour photography through the camera of Karl W. Gullers, Stockholm, and shown at an exhibition entitled "Swedish Industry in Colour," held at the Federation of British Industries, London, S.W.1, this week.

STRIKE OF 1,000 WORKERS in the heating appliance factory of Parkinson & Cowan, Limited, Birmingham, ended on Wednesday. The men first walked out last Friday in protest against the continued employment of two men who had not taken part in an earlier unofficial strike. The strikers were told on Wednesday that one of the two men had resigned and that the other had been transferred to another section.

ECSC Coal Stocks Are Lower

PRELIMINARY figures issued for January by the High Authority of the European Coal and Steel Community show a fall of 700,000 tons in pithead stocks, lower returns being made for all countries except France. Total Community stocks, at 30,570,000 tons, are down by 2,000,000 tons compared with last September. In the same period of 1958-59 stocks rose by more than 3,000,000 tons.

In January, less than 500,000 tons of output was lost by short-time working, which compares with an average monthly loss last year of over 1,000,000 tons. Consuming industries appear to be reconstituting their stocks, although, of course, the improved position is partly due to wintry weather and partly to reduced imports from countries outside the Community.

LAW CASES

APPEAL ON DERMATITIS FAILED

EMPLOYERS of a machine-oiler who contracted industrial dermatitis in 1954 while working at the East Kilbride factory of Rolls-Royce, Limited, had not failed in their duty towards him, Lord Cohen ruled in the House of Lords. The man, Mr. John Brown, who claimed damages from the company alleging negligence, lost his appeal against a majority decision of the First Division of the Court of Session that the employers were not at fault in failing to provide him with a barrier cream as a protection against the disease.

Lord Cohen said it was for the workman to show the employers had been negligent and that their negligence had caused his injury. By applying that principle to the facts found by the First Division, which were not open to challenge, he came to the conclusion that the employers had not failed in their duty and that the appeal should be dismissed. Lord Reid, Lord Radcliffe, and Lord Denning concurred.

Also agreeing, Lord Keith said that failure to supply barrier cream in accordance with a common practice by other employers had to be considered along with other material circumstances. The ultimate test was whether there was reasonable care for the safety of the workman in the circumstances.

£4,000 FOR MINER'S LOST ARM

JURY sitting with Lord Kilbrandon in the Court of Session awarded £4,000 damages to Mr. Richard Stein, a 24-year-old assistant machineman at Moat Colliery, Roslin (Midlothian), whose left arm had to be amputated after an accident on August 20, 1956. Mr. Stein had sued the National Coal Board for £6,000.

He told the court that he was injured when, while crossing a conveyor belt, the belt suddenly started up and he was thrown down and his left hand was drawn under the delivery end of another belt. His arm was practically torn off in the machinery and had to be amputated on the spot. There was, in addition, a fracture of the humerus.

Mr. Stein claimed that the injuries to blood vessels, nerves, and joints were so gross that further amputation had to be carried out at the level of the fracture. He was ultimately fitted with an artificial arm, but this, he said, was mainly for appearance and was of little use to him.

The National Coal Board denied liability. The board contended that at the time of the accident Mr. Stein had been riding on a belt, an act which he knew was contrary to regulations.

MINER "PARTLY TO BLAME" FOR ACCIDENT

MINER who received a face injury at Rose Heyworth Colliery, Abertillery, must bear a third of the blame for the accident, said Mr. Justice Davies at Monmouthshire Assizes. The miner, Mr. George Charles Amos (35), received a fractured right cheek and a scarred upper lip from the handle of a conveyor belt tension box. He was awarded £324 damages.

The plaintiff, a collier for 18 years, said the conveyor belt broke three times during the shift. The fourth time it was repaired, the belt started before he could shout the usual all-clear warning. The handle flew back and struck him in the face.

For the National Coal Board, Mr. Alan King Hamilton, QC, denied negligence. The judge said, however, that the board should bear the rest of the blame because a fitter was negligent in failing to ensure everything was safe before the conveyor started. He added that Mr. Amos could not have been struck if he had been in the proper position behind the handle.

STEEL COMPANY NOT TO BLAME

"THIS man was the author of his own wrong," said Mr. Justice Davies at Monmouthshire Assizes when he dismissed the claim of a welder who tripped and cut his thumb on a sheet of steel in a Newport steelworks. The claim was made by Mr. Alec Gordon Watkins (41) against the Steel Company of Wales, Limited, in respect of an injury he sustained at the Orb Works in September, 1957.

For Mr. Watkins, Mr. Charles Pitchford said the plaintiff tripped over a piece of timber protruding from a pile of steel sheets and, as a result of the injury, he now had a permanently stiff thumb. He claimed that a safe access to Mr. Watkins's place of work had not been provided.

Mr. Patrick Graham, QC, for the company, said there was no negligence on the part of the firm. Mr. Watkins had previously found a safe access and used it four times before the accident.

INJURED AT NEWPORT STEELWORKS

DAMAGES of £3,500 with costs were awarded to Mr. Samuel Simms (41), warehouse packer, at Monmouthshire Assizes. Mr. Justice Davies awarded judgment by consent to the plaintiff, who claimed damages from his employers, the Steel Company of Wales, Limited.

For the plaintiff, Mr. E. Ryder Richardson, QC, said Mr. Simms was severely injured when a large hook fell against him at the Orb Works, Newport, in June, 1958.

Mr. Simms said he was hit as he turned away after placing the large hook on the hook of a crane. "The next thing I knew, something hit me across the back and I injured my leg," he said. The lower half of his left leg had been amputated and he spent eight weeks in hospital. He did not work for six months.

WOMAN CRANE DRIVER BLAMED

MR. JUSTICE JONES at Derbyshire Assizes dismissed a claim for damages by a labourer, Mr. John Wilson, who sued his employers, the Stanton Ironworks Company, Limited. He claimed that he was injured while assisting to load moulding boxes which were being lowered on to a conveyor belt by a crane driven by Mrs. Mary Syson.

Stating that he was guiding the boxes down when suddenly the crane swung them away from him, Mr. Wilson said he was putting the whole blame for the accident on Mrs. Syson, but added: "She is a very good crane driver. She has never done it before and she has never done it since."

Mrs. Syson said she could not remember the accident or any incident like it.

RUN OVER BY MOBILE CRANE

DAMAGES of £1,750 were awarded by a jury sitting with Lord Migdale in the Court of Session to a labourer who was knocked down and run over by a mobile crane at Station Ironworks, Loanhead, Edinburgh, on February 19, 1956. The man, Mr. John

Drever Purves (64), claimed £4,000 damages from his employers, MacTaggart, Scott & Company, Limited.

Mr. Purves said he was standing at the side of the road to assist in a lifting operation when the crane driver allowed the crane to run against him. He suffered serious crushing of the right foot and leg. The company denied liability and said that the crane was moving steadily and slowly. The driver was in no way responsible, it was claimed.

STEEL ERECTOR'S FALL

JUDGE COHEN at Middlesbrough County Court dismissed the claim for £400 damages of Mr. Trevor Parvin, a steel erector, who fell 30 ft. from scaffolding at the Cleveland Ironworks of Dorman, Long & Company, Limited. For the plaintiff it was stated that he was working on a framework of girders and was receiving a 30-ft. long steel plate. While he was trying to adjust a spanner to hold the plate in position it was moved causing Mr. Parvin to fall.

Commenting on the fact that immediately after the accident the foreman had done the job with the same tackle, Judge Cohen referred to inconsistencies in Mr. Parvin's evidence. He awarded costs against the plaintiff.

PIT WORKER'S CLAIM FAILS

ONCOST worker, Mr. John Rankin, who injured his big toe in Michael Colliery, East Wemyss (Fife), last year, had his claim for £300 damages turned down at Dunfermline Sheriff Court. He stated that he was walking on concrete paving slabs in the Seamine roadway of the colliery when he tripped in a 9-in. triangular hole in one of the slabs and injured a toe.

For the Coal Board it was denied there was a hole of that size and it was claimed the sum sued for was not reasonable. Sheriff R. R. Kydd said that for the claim to be relevant Mr. Rankin would have had to show what reasonable inspection by the NCB would have disclosed the hole. He awarded costs to the Coal Board.

LABOURER WHO FELL GETS £3,250

A LABOURER who stepped on a loose brick and fell after stripping the bricklining from a pipe was awarded £3,250 damages from his former employers, Cochranes (Middlesbrough) Foundry, Limited, at York Assizes.

The plaintiff, Mr. Francis James Hinde (44), said the accident occurred at the works in 1958 when he was climbing down backwards. He was now permanently incapable of doing heavy work and could not find another job.

Mr. Justice Salmon said that a ladder should have been supplied by the firm. He entered judgment with costs for Mr. Hinde.

NCB FINED £100

FINES totalling £100 for keeping explosives in the yard of Elsecar Main Colliery and in the unlocked vestibule of the colliery's powder magazine were imposed on the North-Eastern Divisional Coal Board at Barnsley. Mr. G. A. Milner, for the Coal Board, pleaded Not Guilty to both charges.

For the prosecution it was stated that a policeman found two canisters of gunpowder in the colliery yard and another three in the vestibule.

Mr. Milner stated that the explosives were in the yard for only a short time. The board was charged with keeping them there whereas that was not the case.

INJURED AFTER PROTEST

TEES-SIDE steelworker, Mr. Dennis Dorgan, in his action at York Assizes against his employers, the Normanby Iron Works Company, Limited, Darlington, claimed that although he protested against the danger, he was ordered to climb on recently-painted steelwork, wet with rain, to unfasten crane hooks. He fell from the slippery foothold and received shoulder and back injuries.

He was awarded damages of £2,000, the judge stating that if employers took risks of this kind by sending men to walk on wet and newly-painted steel, it was impossible to say they had taken all reasonable care.

DURING THE HEARING at Port Talbot County Magistrates' Court, of charges of stealing coal it was stated that more than 16 tons had been stolen recently from the sidings of the privately-owned West End Colliery at Abercregan of Jones & Bevan, Limited.

TWO BOYS who were crushed by a steamroller were awarded a total of £13,000 damages at Monmouthshire Assizes against H. Richards & Company, Limited, engineers, of Newport. Mr. Justice Arthian Davies awarded £7,000 damages to David James (8), and £6,000 to Clive Coding (11), who lost his left leg after the accident. The judge said that the injuries were terrible and that the cases were extremely difficult. "I have been able to find nothing in the books closely approximating these two cases," he added.

50,000 Tons of Coal Will Leave Midlands by Road

ABOUT 50,000 tons of small coal is to be transported by lorries instead of rail from the East and West Midlands Divisions of the National Coal Board to ease the coal stocking situation. Mr. Albert Martin, secretary of the Notts Area council of the National Union of Mineworkers, said after a council meeting on Saturday: "We have been concerned about the agreement between the Electricity Board and British Railways whereby none of this coal should be transported by road. We pressed this matter at all levels because it concerned our stocking of coal."

Mr. Martin said that stocks need not have accumulated if this system had been used beforehand. He hoped the board would use its own lorries and not be faced with the necessity of putting it out to private contract.

Recent Wills

JOHNS, HELLIER, of Fishguard (Pembrokeshire), coal merchant £19,023

RATCLIFFE, G. H., of Horsley Woodhouse (Derbyshire), retired colliery deputy £5,693

JONES, LIONEL SOUTHWOOD, late mineowner and brick manufacturer, of Newport (Mon) £29,870

CAWOOD, G. B., a director and former chairman of Cawood, Wharton, Limited, industrial and domestic fuel distributors, former honorary house coal officer for the North-East Region, and five times chairman of the North of England Coal Traders' Association £38,023

INTESTATE

VAHEY, F. M., section leader, industrial heating, in the control gear sales department, motor and control gear division, Associated Electrical Industries, Limited, Rugby £4,205

PREECE, ARCHIBALD, formerly head of the Department of Metallurgy at King's College, Newcastle-upon-Tyne, and Reader in Metallurgy at Leeds University,, and a past president of Leeds Metallurgical Society £9,429

Personal

Mining Qualifications Board

PROFESSOR OF MINING of the Royal School of Mines, London University, since 1953, Prof. J. C. MITCHESON has been appointed by the Minister of Power to be a member of the Mining Qualifications Board.

He succeeds Prof. F. S. Atkinson, of Sheffield University, who has completed his term of office. Prof. Mitcheson began his career as a Lecturer in Coal Mining, at Birmingham University and then became agent and later managing director of Morris & Shaw, Limited, owners of the Birch Coppice collieries, Tamworth (Warwickshire).

During the war he was the Ministry of Fuel and Power's director of production for the Warwickshire coalfield and after vesting date was, for a short time, mining development engineer of the West Midlands Divisional Coal Board. He was a consultant mining engineer before taking up his present appointment.

Mr. J. S. FULTON, principal of the new University College of Sussex, who has been chairman of the board since 1950, has been reappointed in that office, and the Minister has reappointed Mr. T. A. ROGERS, HM Chief Inspector of Mines, as a member of the board.

Mr. FRANK C. YOUNG, an engineering and motoring journalist, has joined the public relations division of Simms Motor & Electronics Corporation, Limited, London, N.2.

Mr. W. SUGGETT, for many years manager of the invoice, shipping and transport departments of Thomas Summerson & Sons, Limited, manufacturers of railway fixed plant, etc., of Darlington (Co. Durham), has received a presentation on his retirement.

Mr. J. CRAWFORD, of the National Association of Colliery Overmen, Deputies, and Shotfirers, was on Wednesday elected to fill the vacancy on the TUC General Council caused by the death of Mr. B. Walsh.

Mr. RAYMOND MCKIE, secretary and a director of Hopkinsons, Limited, iron and steel founders, etc., of Huddersfield (Yorks), was presented with a table lamp at a dinner held to celebrate his 25 years' service as organist and choirmaster at St. James's Presbyterian Church, Huddersfield.

Mr. CHARLES D. GILL, chairman of the Spencer Wire Company, Limited, Wakefield, is leaving on Wednesday for Australia where he will attend the Federation of Commonwealth and British Empire Chambers of Commerce Congress at Canberra. Mr. Gill is chairman of the Federation.

Mr. J. TINNEVELD, engineering director of Cockburns, Limited, engineers, spring and valve makers, of Glasgow, left Renfrew by air last week on a business trip to various parts of South Africa. He hopes to negotiate licence agreements for the manufacture of valves and also to arrange agency representation.

Mr. C. C. VINSON, who is a director of Broom & Wade, Limited, manufacturers of air compressors, pneumatic tools, rock drills, etc., of High Wycombe (Bucks), has joined the board of the Fairey Company, Limited. He was formerly on the board of the Fairey Aviation Company, Limited, from 1937 until 1952.

Alderman H. SLACK, who recently retired after 30 years as general secretary of the cutlery branch of the National Union of General and Municipal Workers, was presented with a silver salver by Mr. D. A. Palmer, vice-president of the association, at the diamond jubilee dinner of the Sheffield Cutlery Manufacturers' Association last Friday.

Mr. C. J. CARTER, director and manager of John Thompson-Kennicott, Limited, water purification specialists, of Wolverhampton, retires next month after more than 50 years' service. He has been concerned with water treatment systems for 41 years. His successor will be Mr. W. J. JEAVONS, who has been with the company for 15 years.

Mr. E. T. SWITSUR, Warwickshire area industrial relations officer of the West Midlands Divisional Coal Board since vesting date, is to retire on March 31. For many years he was a branch secretary and checkweighman at Birch Coppice Colliery, Dordon. Mr. Switsur is a former member of Warwickshire County Council and Atherstone Rural Council.

Completion of 50 years' service with the Sheffield firm of Ambrose Shardlow & Company, Limited, manufacturers of dropforgings, crankshafts, etc., was marked by the presentation of an automatic tea-making machine to Mr. W. M. RAMSEY. The presentation was made by the managing director, Mr. J. C. Proudfoot. Mr. Ramsey joined the firm when he was 17.

Sir STUART GOODWIN, president of the Neepsend Steel & Tool Corporation, Limited, chairman and managing director of Goodwin & Company, Limited, Sheffield steelmakers, and a chairman or director of many other companies is to receive the freedom of the Borough of Retford. Sir Stuart is an old boy and benefactor of Retford's King Edward VI Grammar School.

Mr. J. A. HALLAM, excavator division field service inspector of Newton, Chambers & Company, Limited, Thorncliffe, near Sheffield, is spending six weeks in Chile, where he is to advise Componia Minera Sante Fe, which recently acquired seven NCK-RapieR 605 face shovels which are being used in a mountain area where there is an exceptionally high yield of iron ore.

Last September, Richard Sutcliffe, Limited, Horbury, near Wakefield, announced the appointment of Mr. MATTHEW REID MOORE as manager of its mining and general products division. From March 1 Mr. Moore will take over duties as the company's general sales manager. In that capacity he will control all Richard Sutcliffe's sales activities, both mining and industrial.

MR. M. R. MOORE

Mr. Moore has been with the company since completing his service with the Coldstream Guards during the last war. For 10 years he was the company's district technical manager for the Northern (N & C) and Durham Divisions of the National Coal Board and industrial representative for the north of England. Born at Boldon (Co. Durham) in 1914, he received his training with the Harton Coal Company, Limited, South Shields.

A business trip to South America is being undertaken by Mr. ERIC MENSFORTH, deputy chairman of John Brown & Company, Limited, chairman of Firth Brown Tools, Limited, and a director of Markham & Company, Limited, the Chesterfield mining and mech-

anical engineers, etc., and of many other companies. He left on Sunday and will be away until the end of March.

Mr. LESLIE HALL, joint managing director of the Nobel division of Imperial Chemical Industries, Limited, and Mr. F. B. WRIGHTSON, engineering director, both of whom have completed 30 years with the company, were among those to receive long-service awards to headquarters staff in Glasgow. The awards were presented by Dr. James Craik, chairman of the Nobel division.

Mr. E. S. SELLERS, formerly Professor of Chemical Engineering at the University College of Swansea, University of Wales, has joined the British Petroleum Company, Limited. As from March 28 next he will be manager of the petroleum division of the company's Sunbury research centre in succession to Mr. W. M. CATCHPOLE, whose new appointment will be announced later. Mr. Sellers previously served with the company in Iran from 1935 to 1938.

Mr. W. MASON and Miss N. GEORGE both received cheques on Monday in recognition of 65 years' service with Samuel Heath & Sons, Limited, stamped brassfounders, etc., of Birmingham. Mr. Mason and Miss George, who have worked for four generations of the Heath family, were presented with their gifts by Mr. Samuel Heath, son of the managing director, Mr. Denis Heath, and great-great-grandson of the founder of the firm. Neither recipient has any intention of retiring.

President of the Locomotive and Allied Manufacturers' Association of Great Britain for 1960 is Lord CHANDOS. The chairman of Associated Electrical Industries, Limited, has been appointed to succeed Lord NELSON of STAFFORD, chairman of the English Electric Company, Limited. The new chairman of the association is Col. GERALD COLLINGWOOD, managing director of Vulcan Foundry, Limited. He succeeds Mr. G. T. OWEN, managing director of the North British Locomotive Company, Limited.

Mr. WILLIAM K. WHITEFORD, president of the Gulf Oil Corporation, Pittsburgh, and a director of the Jones & Laughlin Steel Corporation, has been elected a member of the advisory committee of the International Nickel Company of Canada, Limited. The advisory committee consists of persons elected by the board to assist it and the officers in the formulation of basic policies. In addition to Mr. Whiteford, who is not a director, the committee consists of Lord Margesson, of London, as its chairman, the three senior officers of the company, and others.

Weak Employers Blamed for "Wild-Cat" Strikes

STRIKES, particularly "wild-cat" strikes, were the one thing threatening Britain's hopes for prosperity, said Sir Halford Reddish, chairman and managing director of the Rugby Portland Cement Company, Limited, in an address to the London branch of the Incorporated Sales Managers' Association on Thursday of last week. He said: "Our record is worse than that of any other civilized country."

Saying that trade union leaders must bear responsibility for their inability to control their own members, Sir Halford went on: "But the weakness of so many employers in private industry and the nationalized industries alike, towards flagrant breaches of contract is an important factor. Indeed, they must in my view take the larger share of the blame."

New Appointment for Capt. Leighton Davies

ONE of the three chairman of industrial estates corporations which are to take over management of the Board of Trade's industrial property, both in existing development areas and in new areas where help is to be made available is Capt. H. Leighton Davies, assistant managing director and general manager of the tinplate division of the Steel Company of Wales, Limited. He is to retire in June, but will remain as consultant to the company.

Capt. Davies is a member of the council of the British Iron and Steel Federation, a life member and past president of the Iron and Steel Institute, and chairman of a number of organizations concerned with encouraging industrial development in Wales. His new appointment is a part-time one as the industrial estates in Wales are not so extensive as those in England and Scotland.

Chairman of the Scottish corporation is Sir Robert Maclean, chairman of Scottish Industrial Estates, Limited, and Mr. Sadler Forster, chairman of the North Eastern Trading Estates, Limited, a non-profit-making company set up in 1936 to attract light industries to the area, becomes chairman of the English corporation.

COMMITTEE STARTS SURVEY OF SCOTTISH ECONOMY

WORK of the six-man committee of inquiry into Scotland's economy has already begun. Its aims are to gather facts on subjects including unemployment, special labour problems, industrial relations, the state of Scottish management, attraction of new industry, and research and development. The work is sponsored by the Scottish Council (Development and Industry).

Committee-chairman, Mr. J. N. Toothill, director and general manager of Ferranti, Limited, Edinburgh, said at a Press conference on Monday that already something like 100 different lines of inquiry had been embarked upon. The report to be produced by the committee would have a twofold purpose. Primarily it would be submitted to the Government with, perhaps, recommendations, and secondly it would show Scottish industrialists and workers the part they should play.

Other members of the committee are:—Mr. J. Russell Lang, managing director of G. & J. Weir, Limited, Glasgow; Mr. J. G. S. Gammell; Mr. W. Roxburgh, managing director of Astral Equipment, Limited, Dundee; Prof. T. Wilson, and Mr. A. J. C. Hoskyns-Abrahall.

Rotherham Steelworks' Plan Ousts 70 Families

ABOUT 70 families are to be moved out of Templeborough, in Rotherham and their houses demolished to make room for £10,000,000 extensions to the works of the Steel, Peech & Tozer branch of the United Steel Companies, Limited. They have been told that the company would spend up to £650 each on re-housing.

The Ministry of Housing may increase Rotherham's allocation of houses to meet the problem, and a joint trust to provide new homes is planned between the company and Rotherham Corporation.

Appointments

General Electric's Engineering Group

NEW appointments at the engineering works at Erith (Kent) of the General Electric Company, Limited, have been made following the appointment (announced in our February 12 issue) of Mr. R. N. Millar as managing director of the company's engineering group. As from April 1, Dr. K. J. WOOTTON will become general manager of the Erith works, with Mr. C. J. O. GARRARD as the deputy general manager. Dr. H. K. CAMERON, who has been appointed manager of the atomic energy division at Erith, will take up his new duties on the same date.

Dr. Wootton joined the GEC at its Wembley research laboratories in 1955 and soon afterwards he was appointed to assume control of engineering research and development in the GEC/Simon-Carves Atomic Energy Group. After some months as assistant manager of the GEC atomic energy division, Dr. Wootton became manager of that division in April, 1958.

His successor in that position, Dr. Cameron, has been associated with the GEC since 1930, when he joined the Wembley research laboratories. After the war he was associated in the early days of Harwell on several research projects, such as those on graphite and isotope separation. In 1952 Dr. Cameron became manager of the chemistry and engineering division at the GEC laboratories, covering chemical, metallurgical, and materials work generally as well as mechanical, control, and heating engineering.

Mr. Garrard joined the GEC in 1934 at the company's Witton works. In 1943 he became assistant manager of the switchgear works, and manager in 1947, and in 1956 he was appointed manager of the switchgear and transformer works. Since the autumn of 1958 he has been in charge of engineering sales in the Southern England area.

Mr. A. J. INGRAM, formerly with the West Midlands Gas Board, has joined the outside sales advisory staff of Blackstone & Company, Limited, engineers, of Stamford (Lincs).

Mr. G. W. BROOKS has been appointed manager of Algernon Colliery, Backworth (Northumberland). He previously held a similar post at Bardon Mill Colliery in the same county.

Mr. JOSEPH SAMUELS, purchasing director, and a member of the board since 1956, of Winston Electronics, Limited, Shepperton (Middx), has now been appointed works director in charge of production.

Mr. D. H. ROBERTS, secretary of Metal Industries, Limited, has been appointed secretary of Lancashire Dynamo Holdings, Limited. Metal Industries recently made a successful offer for the capital of Lancashire Dynamo.

Mr. E. H. BATE, who retired last year as Chief Civil Engineer of the Ministry of Works, has been appointed as consultant in the fields of civil and structural engineering with Morgan & Company, the Leeds consulting engineers.

Mr. C. H. SOPPET has been appointed apprentice education and training officer of Head Wrightson & Company, Limited. This new appointment has been made because of an extension in the company's training programme for apprentices.

Mr. JOHN WORSWICK, commercial manager for the past 12 years, of Moorwoods, Limited, ironfounders, makers of catering equipment, etc., of Sheffield, a subsidiary of Brightside Engineering Holdings, Limited, group, has been appointed a director in charge of sales.

Mr. P. O. STRANDELL has been appointed consultant for the range of high-carbon steel products produced by Firth Cleveland Steel Strip, Limited, Tipton (Staffs), which is now specializing in the production of high-carbon steel strip to the exclusion of all other cold-rolled products.

For the past 12 years works manager at the Hills Engineering Company, Limited, Sheffield, Mr. TOM TAYLOR has been appointed production manager of the Glanamman (Carmarthenshire) factory of Crompton Parkinson, Limited. Mr. Taylor served his apprenticeship with Newton, Chambers & Company, Limited.

Mr. LESLIE H. DAVIS, lubricants supervisor, of Scottish Oils & Shell-Mex, Limited, Glasgow, has been appointed lubricants manager, southern division Shell-Mex & B.P., Limited, Southampton, to succeed Mr. W. J. Gooding who has retired. Mr. Davis is succeeded by Mr. W. W. HARROW, lubricants supervisor at the Dundee branch.

Mr. WILLIAM A. STARKEY has been appointed chief electrical and mechanical engineer to the Lodna Coal Company, Limited, of Lodna, near Calcutta, India. Mr. Starkey was previously unit electrical engineer at Merrilees Colliery (Leics). In India he will take charge of the engineering at four collieries, each of which has its own generating station.

Renold Chains Plans Scrip Issue

BENEFITS from the substantial capital investments by Renold Chains, Limited, in recent years "are gathering momentum" and the net profit for the current year will be a record. A one-for-two scrip issue is anounced which will capitalize £2,660,362 of capital reserves for holders of March 29, when an extra-ordinary meeting is being called to create capital.

The scrip issue is prompted by a revaluation of certain properties and equipment which resulted in an excess of £1,723,000.

At the annual meeting next August the board expects to recommend a final dividend of at least 8 per cent. on the larger capital. This is equivalent, together with the 3 per cent. interim already paid, to a total of 15 per cent. on the existing capital, as against 12½ per cent. for 1958-59.

Brightside Foundry's £635,000 Order for Brymbo Steel

ORDER for the manufacture and installation of a 32-in. blooming mill for the Brymbo Steel Works, Limited, Brymbo, near Wrexham, has been placed with the Brightside Foundry & Engineering Company, Limited, Sheffield.

The mill is due to be in operation in 1961 and is part of Brymbo's second development scheme, which is costing over £2,000,000. The scheme will provide rolling capacity up to 250,000 ingot tons to balance the steel producing capacity installed in the first development scheme. Electrical equipment for the mill is being supplied by the English Electric Company, Limited.

Value of the order placed with Brightside Foundry is £635,000.

British Blast Furnaces in the December Quarter, 1959

(These tables are published through the courtesy of the British Iron and Steel Federation.)

Derbyshire, Leicestershire, Notts, Northants, and Essex.

Name of firm.	In blast at end of the fourth quarter, 1959.					Weekly average in blast.	Total existing at end of quarter.
	Hematite.	Basic.	Foundry and forge.	Ferro-alloys.	Total.		
Ford Motor	—	—	1	—	1	1	1
Holwell Iron	—	—	1	—	1	1	4
Renishaw Iron	—	1	1	—	2	1.5	2
Sheepbridge	—	1	1	—	2	2	2
Stanton Ironworks: Stanton-by-Dale	—	—	4	—	4	4	5
Staveley Iron & Chemical	—	—	3	—	3	3.1	4
Stewarts and Lloyds: Corby	—	4	—	—	4	4	4
Wellingboro' Iron	—	—	—	—	1	1	3
TOTAL	—	7	11	—	18	17.6	25

Lancashire (excl. N.-W. Coast), Denbighshire, Flintshire, and Cheshire.

Brymbo Steel Works	—	1	—	—	1	—	1
Darwen & Mostyn Iron	—	—	—	1	1	1	2
Lancashire Steel Manufacturing	—	2	—	—	2	2	3
Summers, John	—	2	—	—	2	1.7	2
TOTAL	—	5	—	1	6	4.7	8

North-West Coast.

Barrow Ironworks	2	—	—	—	2	2	4
Charcoal Iron	—	—	1	—	1	0.4	1
Millom Hematite Ore & Iron	2	—	—	—	2	2	3
United Steel: Workington	2	—	—	1	3	3	3
TOTAL	6	—	1	1	8	7.4	11

Lincolnshire.

Appleby-Frodingham Steel	—	4	—	—	4	3.1	4
Lysaght's Scunthorpe Works	—	3	—	—	3	3	3
Thomas, R., & Baldwins: Redbourn	—	3	—	—	3	2.4	3
TOTAL	—	10	—	—	10	8.5	10

North-East Coast.

Consett Iron	—	3	—	—	3	3	3
Dorman Long (Steel): Acklam	—	2	—	—	2	2	4
Redcar	—	—	—	—	—	—	2
Bessemer	—	1	—	—	1	1.1	3
Clay Lane	—	2	—	—	2	2	2
Gjers, Mills	2	—	—	—	2	2	3
Normanby Iron Works	—	—	—	—	—	—	3
Skinningrove Iron	—	2	—	—	2	2	3
South Durham Steel & Iron: West Hartlepool	—	2	—	—	2	2	3
Cargo Fleet	—	2	—	—	2	2	3
TOTAL	2	14	—	—	16	16.1	29

Scotland.

Bairds & Scottish Steel: Gartsherrie	1	1	—	—	2	2	3
Carron	—	—	1	—	1	1	4
Colvilles: Clyde Iron Works	—	2	—	—	2	1.8	3
Ravenscraig	—	1	—	—	1	1	1
TOTAL	1	4	1	—	6	5.8	11

South Wales and Monmouthshire.

Guest Keen Iron & Steel: Cardiff	1	2	—	—	3	3	4
Thomas, R., & Baldwins: Ebbw Vale	—	2	—	—	2	3	3
Steel Company of Wales: Margam	—	5	—	—	5	5	5
TOTAL	1	9	—	—	10	11	12

Non-ferrous Metals

Price Collapse in Copper

THE unexpectedly large rise of copper stocks in London Metal Exchange warehouses last week by 650 tons to 4,122 tons was the one point needed to shatter the London price structure.

Indeed, with bearish influences piling up over the last two to three weeks, it was quite remarkable that the London prices held as long as they did.

However, the improved stock position triggered off the price collapse at the beginning of this week, with the cash price dropping 11 points to approximately £252 a ton and the closing up of the backwardation to £9 12s. 6d., which compares with a back of £31 a ton at its widest point the previous week.

US Production

In the United States production capacity is almost back to normal with only the Laurel Hill refinery and the White Pine Copper Company mine still strike-bound.

The hard facts are that despite the very short time in which the US copper industry has had to get back into its stride, production of refined copper in the US in January reached 65,061 tons, compared with the December level of 21,686 tons and a pre-strike rate of some 100,000 tons.

Moreover, copper production, ex-USA, has been continuously expanding and the pipelines are being better served than anyone had expected.

At present US producers are selling at 33 cents and custom smelters at 35 cents a pound, although there are some deals taking

place—not very many—in which prompt copper in dealers' hands is still commanding a premium of about 2 cents a pound.

In all these circumstances consumers are reluctant to enter the market and the outlook must necessarily remain a little blurred until the market prices more nearly approximate to the true supply and demand position.

Tin has been a reasonably good market in London and in New York, although slightly patchy in Singapore. In the US the price has been above $1.02 a pound, but is fractionally below that level at the moment.

In London only minor fluctuations have occurred and the cash price is fairly steady around £792 a ton.

Lead has been a good market in London and prices have edged up to around £75 a ton.

The rise does not seem to be solidly based, as there is a strong element of speculation on the grounds that the price level is too low in relation to that of zinc.

Zinc has been a sagging market in London, but has recovered some of its former strength. Yet, increased availability of the metal from the Continent and the belief that the days of chronic shortages have passed—temporarily, at any rate—have been the cause of the price dropping to around £87 a ton.

In the US the market is good for both "Prime Western" and the special high grades and the price is firm at 13 cents a pound.

Official metal prices in London yesterday (Thursday) were:—COPPER, Standard: Prompt £253 10s., forward £242. TIN, Standard: Prompt £789, forward £788 10s. LEAD: Prompt £74 7s. 6d., forward £74. ZINC: Prompt £87 7s. 6d., forward £87 10s.

British Blast Furnaces in the December Quarter, 1959—*continued*

Staffordshire, Shropshire, Worcestershire, and Warwickshire.

Name of firm.	In blast at end of fourth quarter, 1959.					Weekly average in blast.	Total existing at end of quarter.
	Hematite.	Basic.	Foundry and forge.	Ferro-alloys.	Total.		
Goldendale Iron	—	—	1	—	1	1	2
Shelton Iron & Steel	—	3	—	—	3	2.6	3
Stewarts and Lloyds: Bilston	—	1	—	—	1	1	2
TOTAL	—	4	1	—	5	4.6	7
Sheffield.							
Park Gate Iron & Steel	—	2	—	—	2	2	2
GRAND TOTAL	10	55	14	2	81	77.7	115

Weekly Average Number of Furnaces in Blast during the December Quarter, 1959, and the Previous Four Quarters

District.	1958.	1959.			
	Dec.	March.	June.	Sept.	Dec.
Derby, Leics., Notts., Northants, and Essex	20	20	18.8	17.7	17.6
Lancs. (excl. N.-W. Coast), Denbigh, Flint, and Ches.	6.9	6.9	7	5.8	4.7
Lincolnshire	9.5	8	8	8	8.5
North-East Coast	18	17.4	17	15.6	16.1
Scotland	6.7	6	5.8	5	5.8
Staffs., Shrops., Worcs., and Warwicks.	5	4.9	4	4	4.6
South Wales and Monmouth	10.4	9.5	9.6	9.6	11
Sheffield	2	2	2	2	2
North-West Coast	6	7.4	7	6.6	7.4
TOTAL	84.5	82.1	79.2	74.3	77.7

The following companies have furnaces in course of construction or rebuilding:—Lancashire Steel Manufacturing; J. Lysaght's Scunthorpe Works; Bairds & Scottish Steel.

Rising British Sales for New Ropebelt

ABOUT 20 miles of Distington-Goodman ropebelt structure was sold in Britain last year, with sales rising through the year to a peak in the last quarter. Distington Engineering Company, Limited, Workington, a member of the United Steel Companies, Limited, is the sole agent in this country for this new type of conveyor, using wire rope for side frames and flexible idler assemblies.

It was originally developed by the Goodman Manufacturing Company, Chicago, which holds British patents on the basic structure, and was introduced into Britain in 1958.

RTB Announces New Appointments

NEW appointments, to become effective on March 1, have been announced by Richard Thomas & Baldwins, Limited, Mr. C. G. Davies, works manager of the Ebbw Vale section, becomes general manager of the Redbourn section, and Mr. L. G. Stock, assistant works manager, Ebbw Vale section, is to be transferred to RTB (Sales), Limited, in London as manager of technical sales services (flat rolled products).

As a result of these appointments, several promotions will be made in the Ebbw Vale section. Mr. I. C. Gwynne, manager (sheet and tinplate) becomes assistant general manager (production), and Mr. J. S. Blair, manager (coke and iron) is the new production manager (coke, iron, and steel). Mr. Blair is succeeded by Mr. W. C. R. Penry, assistant manager (blast furnaces). Mr. D. J. Jones, assistant manager (open hearth), becomes manager (steel and brickworks), and Mr. W. D. Jenkins, manager (tinplate departments), will be production manager (rolling mills). Mr. Jenkins will be replaced by Dr. G. R. Parkes, his assistant manager in the tinplate departments.

THE GOVERNMENT OF STYRIA, one of the States of the Republic of Austria, is to carry out measures—including the exclusive use of local coal in a power station—to raise the sales of Styrian coal. The State authorities have also urged that fiscal help should be given to the Styrian coal industry on a national basis.

Exports of British Coal

DETAILS of British coal exports and bunker shipments in January, 1960, and their values, and corresponding figures for January, 1959, are given below.

	Month ended January 31.		Month ended January 31.	
	1959.	1960.	1959.	1960.
	Tons.	Tons.	£	£
Categories				
Anthracite—				
Large	315	7,371	2,909	60,911
Graded	22,153	20,622	199,812	171,625
Cleaned smalls ..	7,551	23,795	41,899	77,403
All other	33,583	35,112	170,842	173,872
Steam coal (including household)—				
Unscreened ..	8,152	2,185	43,834	12,232
Large	21,153	80,892	136,448	371,628
Graded	28,787	54,864	166,254	244,109
Cleaned smalls ..	9,888	95,338	46,404	207,966
Untreated smalls ..	59,732	97,388	198,068	260,312
Other	22,751	24,648	78,695	71,172
Gas coal—				
Unscreened ..	19,358	30,696	97,197	133,286
Large	815	3,296	4,498	14,899
Graded	23,878	43,027	125,745	188,170
All other	844	6,131	4,519	27,311
Coking coal—				
Cleaned smalls ..	6,995	2,050	36,934	8,201
Other	5,081	12,136	25,154	54,246
TOTAL ..	271,036	539,551	1,379,212	2,077,343
Destinations				
Canada	—	—	—	—
Other Commonwealth countries	17	319	195	2,086
Eire	52,192	137,997	256,956	591,669
Finland	399	5,707	2,192	21,902
Sweden	10,504	24,269	47,562	82,638
Norway	6,720	9,451	47,953	52,405
Denmark	73,697	186,980	326,035	555,013
Western Germany ..	11,724	44,786	37,537	132,535
Netherlands	28,569	60,400	150,294	237,760
Belgium	29,958	25,170	146,674	129,312
France	32,175	22,817	211,306	149,590
Portugal	4,821	9,289	27,330	50,750
Italy	2,644	8,996	27,314	46,310
Egypt	—	—	—	—
Argentina	13,737	7	78,355	407
Other foreign countries	3,879	3,363	19,509	24,966
Fuel taken on board vessels engaged in the foreign trade (including fishing vessels) for their own use*—				
British flag ..	56,876	36,635	—	—
Other flags ..	4,209	4,234	—	—

* Fuel taken on board vessels for their own use is not shown by value since it is excluded by definition from the export total of the U.K.

Exports of Coke and Patent Fuel

FIGURES of exports of coke and manufactured fuel from the United Kingdom during January, corresponding figures for January, 1959, and the values of those exports are given below.

Products.	Month ended January 31.		Month ended January 31.	
	1959.	1960.	1959.	1960.
	Tons.	Tons.	£	£
Gas coke	63,890	76,408	441,324	481,850
Hard coke	36,484	50,059	279,045	329,244
Breeze	25,071	34,269	86,590	117,219
Manufactured fuel ..	13,004	22,831	114,084	198,286
TOTAL	138,449	183,567	921,043	1,126,599

Imports and Exports of Mining Machinery

ACCORDING to Board of Trade returns, mining machinery (other than portable power tools) totalling 1,715 cwt. and valued at £70,390 was imported during January. These figures compare with 3,745 cwt. and £134,836 in the same month of 1959.

The appended table contains figures of export quantities and values of mining and well-drilling machinery in January, compared with those for the corresponding month of 1959.

Destination.	Month ended January 31.		Month ended January 31.	
	1959.	1960.	1959.	1960.
	Cwt.	Cwt.	£	£
Union of South Africa	3,299	5,144	67,719	110,396
Rhodesia and Nyasaland	13	4	887	913
India	3,567	5,122	126,708	111,302
Australia	1,198	595	23,063	13,856
Canada	1,156	1,634	23,355	37,404
Trinidad	618	507	26,673	20,463
Other Commonwealth countries and Eire ..	4,079	4,192	105,540	125,308
Netherlands	1,506	502	74,530	18,707
France	241	2,240	14,992	44,655
Venezuela	1,352	58	25,392	5,364
Other foreign countries	12,634	11,348	384,517	404,066
TOTALS				
Well-drilling machinery—				
Petroleum	14,483	9,688	486,345	362,856
Other	1,074	1,035	22,397	38,850
Mining machinery (excluding portable power tools)—				
Coal-cutters, power operated—				
Complete ..	2,492	3,263	73,386	114,573
Parts	1,406	1,373	68,238	70,823
Conveyors, underground—				
Complete and parts ..	3,889	6,924	45,339	78,725
Winders, power operated—				
Complete ..	27	2,900	1,519	56,874
Parts	153	729	9,207	19,234
All other	6,139	5,434	166,945	150,499
TOTAL	29,663	31,346	873,376	892,434

Tyne Coal Shipment Decline Continues

CONTINUED decline in Tyne coal shipments in January was reported at the recent monthly meeting of the Tyne Improvements Commission at Newcastle. The port's coal shipments last year were the poorest since 1945 and among the lowest of the century. In January, export cargoes rose by 173 tons to 68,822 tons, but coastwise shipments fell by 17,558 tons to 454,818 tons. A decrease of 1,625 tons to 4,011 tons in bunker shipments was also reported.

Some recovery was reported in the imports of general merchandise last year. They totalled 2,712,077 tons, an increase of 266,818 tons on 1958. This was largely due to a remarkable improvement in the iron-ore trade. The intake of iron ore rose by 173,440 tons to 967,784 tons.

Board Changes

Head Wrightson's New Vice-Chairman

MANAGING director of HEAD WRIGHTSON & COMPANY, LIMITED, heavy engineers, makers of steelworks plant, etc., of Thornaby-on-Tees (Yorks), since 1955, Mr. Peter Wrightson has been appointed vice-chairman and managing director. He succeeds Sir John Wrightson, who became chairman on the retirement of Mr. Richard Miles on January 31.

MR. PETER WRIGHTSON

Mr. Wrightson is chairman of Head Wrightson Stockton Forge, Limited, and Head Wrightson Machine Company, Limited, and a member of the boards of other Head Wrightson subsidiaries. He is a director of a number of other companies including the Consett Iron Company, Limited, Cupola Mining & Milling Company, Limited, and Metallurgical Equipment Export Company, Limited.

WINGET, LIMITED—Mr. E. F. O. Gascoigne has been appointed a director.

FERRO ENAMELS, LIMITED—Mr. W. R. Todd has been appointed to the board.

S. RUSSELL & SONS, LIMITED—Mr. C. W. King has been appointed a director.

SOUTHERN INSTRUMENTS, LIMITED—Major General Sir William A. Scott has joined the board.

B. & S. MASSEY, LIMITED—Mr. J. S. Byam-Grounds has been appointed deputy managing director.

BRITISH PISTON RING COMPANY, LIMITED—Mr. P. Sprawson, secretary and chief accountant of the company for the last eight years, has been appointed to the board.

WELLINGTON TUBE HOLDINGS, LIMITED—Mr. John P. Hunt has been appointed a director and Sir Walford H. Turner has resigned from the board for reasons of health.

CHARLTON, WEDDLE & COMPANY, LIMITED—Mr. A. J. Wilson has joined the board. He will continue as managing director of Wilson, Taylor & Company, Limited.

JOHN BULL RUBBER COMPANY, LIMITED—Dr. A. P. C. Cummings has been appointed a director of the company, which is a subsidiary of the Dunlop Rubber Company, Limited.

TANGYES, LIMITED—Sir Lionel Kearns has retired from the board in order to reduce his commitments. Mr. F. Harman, commercial manager, has been appointed a director.

MARRYAT & SCOTT, LIMITED—Mr. R. E. Landsbert has been appointed a director of the company and of Marryat & Place, Limited, two of the operating companies of Marryat & Scott Holdings, Limited.

FIRTH COMPANY, LIMITED—Mr. G. R. Dutton has been appointed to the main board of the company, which is a member of the Firth Cleveland group. Mr. Dutton, formerly an executive director, was, and will continue to be, in charge of the sales of the company's products.

URQUHART'S (1926), LIMITED—Mr. R. H. G. Sutton has been appointed deputy chairman. He will continue as managing director. Mr. G. T. Furman, technical director, has been appointed to the board.

LUMBYS, LIMITED—Mr. A. S. Naylor, chairman, has retired after 50 years' service with the company. Alderman Arthur Pickles has been appointed chairman and Mr. Frank H. Dixon has been appointed a director.

SMITH'S STAMPING WORKS (COVENTRY), LIMITED—Mr. Percy Rowley has resigned from the board and also from he board of the subsidiary, Smith-Clayton Forge, Limited, on attaining the age of 70, and after 44 years' service.

BARROW IRONWORKS, LIMITED—Mr. Langton Highton has been appointed a director and will become chairman of the company (a subsidiary of the Iron and Steel Holding and Realization Agency) on March 1. Sir John Fisher, who has been acting chairman since the death of Mr. W. Killingbeck, will retire from the chairmanship and will remain on the board. Mr. Highton, who is also a director of Barrow Steel Works, Limited, was, until recently, a director of the United Steel Companies, Limited, and a number of its subsidiaries.

WOODFIELD PICKERING, LIMITED—Sir Stephen Gibson has joined the board as chairman. The company was formed last September to provide complete offshore oil-drilling equipment for companies engaged in prospecting undersea sources of oil supply. It is a partnership of Woodfield (Rochester), Limited, and R. Y. Pickering & Company, Limited, Wishaw (Lanarkshire), members of the Lithgow group of shipbuilding and engineering concerns. Sir Stephen was managing director of the Iraq Petroleum Company, Limited, from 1950 to 1957.

Industrial Injuries Benefits for People Abroad

RULES about industrial injuries benefits for people who go abroad are being relaxed to allow unemployability supplement and constant attendance allowance to be paid for certain periods of temporary absence from Great Britain. This is done by the National Insurance (Industrial Injuries) (Benefit) Amendment Regulations, 1960, made by Mr. John Boyd-Carpenter, Minister of Pensions and National Insurance, which come into operation on Monday.

The basic industrial disablement benefit can already be paid for any period of absence from Great Britain. A copy of the amended regulations (SI 1960, No. 254) is obtainable from the Stationery Office.

MR. W. J. GRAIN, Mr. L. V. James, and Mr. R. Platts have been appointed local directors of Pneumatic Components, Limited, Sheffield. Mr. James becomes secretary of the company.

COAL AND COKE SHIPMENTS from the South Wales ports in the week ended February 21 dropped by nearly a third below the figure of 67,176 tons the previous week. Last week's shipments (39,189 tons) were held up by the rail strike threat so that as much coal as possible could, if necessary, be concentrated on essential home needs, and the total was, therefore, the lowest since August Bank holiday week last year (34,469 tons). Tonnages shipped (oversea and coastwise) during the week ended February 21 (with comparable 1959 tonnages in parentheses) were:—Newport, 11,604 (7,569); Cardiff, 5,986 (8,769); Penarth, 2,755 (3,118); Barry, 10,338 (9,221); Port Talbot, 1,119 (29); Swansea, 7,387 (16,265).

Imports and Exports of Iron and Steel

FIGURES of imports and exports of iron and steel in January (in terms of tonnage and value), based on Board of Trade returns, are given in the following tables. Details for January, 1959, are also included.

Total Exports of Iron and Steel

Destination.	Month ended January 31.		Month ended January 31.	
	1959.	1960.	1959.	1960.
	Tons.	Tons.	£	£
Cyprus	72	140	7,713	15,309
Sierra Leone	640	419	59,562	40,704
Ghana	740	2,108	64,015	107,154
Nigeria	4,149	6,186	286,305	416,211
Union of South Africa	7,771	7,013	588,234	600,457
Rhodesia and Nyasaland	980	1,506	78,121	107,689
Tanganyika	2,166	652	154,942	47,467
Kenya	3,292	2,036	208,180	116,863
Uganda	548	161	39,958	12,881
Mauritius	152	305	12,164	15,492
Aden	218	126	17,503	9,404
Bahrein, Qatar, and Trucial States	1,609	162	121,100	13,955
Kuwait	1,065	120	77,320	19,530
India	13,853	15,132	881,677	1,009,009
Pakistan	4,319	7,725	199,365	265,610
Singapore	1,891	1,970	147,125	150,444
Malaya	805	1,431	51,422	99,234
Ceylon	5,178	4,995	307,785	264,214
British North Borneo	214	322	20,498	17,329
Hongkong	5,423	6,363	210,755	241,347
Australia	10,332	13,743	901,605	1,062,391
New Zealand	7,591	7,538	573,825	504,049
Canada	9,482	23,148	805,846	1,364,933
Jamaica	2,016	1,890	140,339	142,731
Trinidad	3,062	4,376	193,039	365,205
British Guiana	586	533	31,525	34,608
Other Commonwealth countries	5,346	2,932	354,467	180,605
Eire	3,650	4,283	217,988	276,419
Soviet Union	228	2,214	15,043	982,591
Finland	2,110	3,047	143,463	252,935
Sweden	11,743	24,068	682,516	1,258,798
Norway	8,269	12,766	476,924	705,843
Denmark	5,936	9,367	407,302	619,854
Western Germany	11,149	19,543	344,054	857,691
Netherlands	3,551	11,093	232,658	637,894
Belgium	2,734	4,658	174,483	261,598
France	210	369	49,508	49,843
Switzerland	542	1,289	72,901	149,122
Portugal	1,693	1,139	115,684	92,390
Spain	1,448	1,142	150,429	115,122
Italy	2,974	4,605	191,780	227,516
Austria	260	462	45,369	80,417
Yugoslavia	76	168	7,222	7,421
Greece	546	1,723	28,106	81,880
Turkey	279	183	20,562	14,528
Netherlands Antilles	339	836	35,581	38,864
Portuguese East Africa	127	556	10,662	33,470
Egypt	105	1,366	8,149	62,783
Sudan	834	454	61,573	33,575
Lebanon	20	119	2,982	13,001
Israel	1,090	3,287	49,740	165,154
Saudi Arabia	221	25	42,788	3,422
Iraq	7,631	3,232	497,333	236,975
Iran	2,533	7,476	161,856	467,257
Burma	686	90	43,573	6,359
Thailand	1,593	1,710	116,280	125,956
Indonesia	287	2,681	25,786	207,692
China	10	7,451	6,867	633,465
Japan	1,863	8,608	43,507	179,181
Philippine Republic	319	1,647	23,519	113,362
USA	7,766	30,672	549,520	1,961,209
Cuba	342	970	24,065	76,956
Colombia	55	790	4,965	53,433
Venezuela	7,298	4,002	532,215	307,580
Ecuador	100	125	9,027	9,957
Peru	229	449	12,702	32,741
Chile	73	175	16,864	15,324
Brazil	923	2,439	75,032	178,102
Uruguay	174	840	16,048	62,616
Argentina	25,083	10,176	1,582,417	649,076
Other foreign countries	3,711	15,020	264,927	1,055,940
TOTAL	214,310	320,347	14,128,360	20,620,146

Total Imports of Iron and Steel

From	Month ended January 31.		Month ended January 31.	
	1959.	1960.	1959.	1960.
	Tons.	Tons.	£	£
Union of South Africa	1,576	3,593	102,132	216,645
Rhodesia and Nyasaland	103	995	17,412	123,093
Canada	118	3,438	58,777	243,872
Other Commonwealth countries and Eire	569	4,306	24,077	228,255
Soviet Union	705	4,428	44,452	122,929
Sweden	1,794	2,810	248,037	391,509
Norway	5,076	8,785	333,996	560,804
Poland	344	86	7,591	4,815
Western Germany	1,744	14,536	210,926	1,012,016
Netherlands	10,047	16,008	570,100	1,057,434
Belgium	1,357	4,573	49,087	332,016
Luxembourg	94	645	4,339	35,926
France	439	4,036	53,554	341,187
Italy	54	1,060	11,439	72,946
Austria	376	583	30,709	50,900
Japan	200	424	20,991	41,248
USA	476	2,293	92,268	256,979
Other foreign countries	834	869	69,460	55,151
TOTAL	25,906	73,468	1,949,347	5,147,725
Iron and steel scrap and waste, fit only for the recovery of metal	215	5,899	7,888	94,384

Exports of Iron and Steel by Products

Product.	Month ended January 31.		Month ended January 31.	
	1959.	1960.	1959.	1960.
	Tons.	Tons.	£	£
Pig-iron	12,123	25,747	238,650	483,240
Ferro-columbium (niobium)	5	14	8,805	20,340
Ferro-tungsten	172	107	53,990	45,621
Other ferro-alloys	367	676	67,666	129,747
Ingots, blooms, billets, slabs, sheet bars (incl. tinplate bars), and similar primary forms	7,619	5,562	214,953	191,095
Pieces roughly shaped by forging	23	45	4,520	6,355
Iron bars, rods, angles, shapes, and sections	64	208	5,170	10,503
Steel bars, rods, angles, sections, and shapes	21,036	60,636	1,326,731	2,991,900
Iron plates and sheets	173	36	5,888	2,624
Universal plates	1,337	1,848	64,931	86,169
Steel plates, 3mm. and under 4.5mm. in thickness	1,742	2,436	95,796	148,912
Ditto, 4.5mm. or more in thickness	10,593	24,391	520,774	1,148,382
Blacksheets and blackplate	18,325	29,456	1,378,533	2,212,787
Hoop and strip	6,091	7,644	496,638	639,914
Tinplate	41,470	57,648	3,076,078	4,365,931
Decorated tinplate	595	244	41,031	20,699
Galvanized sheets	6,788	5,245	504,260	381,978
Other (incl. tinned sheets, terneplate, and ternesheets)	844	4,195	78,702	333,740
Railway and tramway construction material	15,810	8,654	814,434	453,020
Wire rods of steel (incl. alloy steel)	3,444	6,984	139,358	322,744
Wire	8,299	9,708	709,927	838,449
Tubes, pipes, and fittings	57,320	68,863	4,281,525	5,785,996
TOTAL	214,310	320,347	14,128,360	20,620,146

A ROLLING MILL with an annual capacity of 30,000 metric tons is to be delivered by the Polish State export authorities to the Indian firm of Prakash. Polish technicians are to erect the unit in Agra before the summer.